Finfish News

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Department
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Food & Rural Affairs

Centre for Environment
Fisheries & Aquaculture
Science

Editorial

Finfish News readership survey

Tim Ellis and David Smith, Editors, Cefas

In the last issue of *Finfish News* we invited readers to provide their opinions on the publication via an internet questionnaire. We would like to thank those readers who contributed to the survey, and a summary of their feedback is provided below.

The response rate survey to the survey was small (8) relative to number of unique visits to the *Finfish News* web pages (824) before the survey closed. However, this response rate (1%) is similar to the survey for the sister publication *Shellfish News,* which was considered normal. The respondents covered most classes of the target audience for the publication, and included fish farmers (salmonid and non-salmonid), suppliers of services to the industry (e.g. veterinary, consultant), regulators (government agency) and broader stakeholders (academic, conservation NGO, general public). The bulk of respondents were from England (63%), with others from Scotland (25%) and Europe (12%).

All respondents considered *Finfish News* to be at least "fairly useful" with the bulk (57%) considering it to be "very useful"; no respondents considered the publication to be "not useful" or "of limited use". All sections received average scores above "fairly useful", with Articles, Industry News, and Research Abstracts being most appreciated.

The majority of readers have adapted to electronic delivery, with 83% reading the content on screen (rather than printing out to read) and aware of email alerts to the release of new issues. A slight majority (67%) approved of the change in format in aid navigation. All appreciated the old editions of *Finfish News* and *Trout News* available on the website, as resource of information.

Comments received indicate that readability can be improved. Suggestions included breaking up the text with more figures, writing continuously across the page (rather than in columns), and following the format of another publication.

This feedback is appreciated and extremely useful to us as editors. In response, we will:

- Focus on those sections that are most appreciated, i.e. Articles, Industry News and Research abstracts;
- Investigate means to improve readability, e.g. more figures, less blank space, larger text, fewer columns. However, we are somewhat constrained by the contributions received, corporate styles, and accepted publishing best practices;
- Explore uploading old editions of Trout News (issues 1-27 published between 1987 and 1999) to the website.

Thanks again to those readers who responded to the survey. We would like to remind readers that contributions to, and comments on, *Finfish News* are welcome at any time. Also, please let us know if you would like to receive an email alert when new issues are released.

Tim Ellis and David Smith, Editors
Email: tim.ellis@cefas.co.uk; david.smith@cefas.co.uk

Editorial

Social Media at Cefas

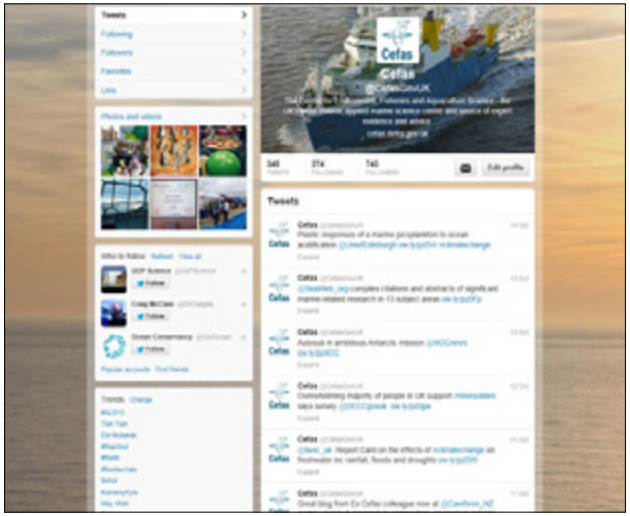
David Smith, Finfish News joint editor, Cefas

Cefas is developing its social media profile as part of a phased internal project. The aims are to make Cefas' work more transparent, reach a wider audience, and provide an additional route to engage in dialogue with industry sectors and the wider scientific community.

Cefas is currently focusing on two social media channels: Twitter (@CefasGovUK) and LinkedIn. Since the project started 6 months ago, we have gained over 750 Twitter followers, and 1,230 LinkedIn followers. Other digital channels, such as Facebook, may be added in future if the initiative is successful in meeting its aims.

Our Twitter account is our main social media channel. It is used to curate real time content from a wide range of Cefas' work. Some of the topics covered are:

- Aquaculture
- Climate change
- Fisheries
- Renewable energy
- Upcoming job vacancies



Twitter increasing awareness of the content of Finfish News and Shellfish News

Cefas also runs a blog focused on our research vessel. This blog is currently hosted on our website (www.cefas.defra.gov.uk/news/survey-blogs.aspx). However, the Cefas Social Media team is looking to expand the content and move the blog to www.gov.uk, the new central government website. Gov.UK will provide a better platform, allowing followers to share articles on Twitter, LinkedIn, subscribe to alerts about updates using RSS feeds, and view blogs produced by other government departments. When this move is complete it will be announced on Twitter.

If you have any questions, ideas for content, or would like to guest contribute, please send Cefas an e-mail at twitter@cefas.co.uk. Finally please follow our Twitter feed (@CefasGovUK) for the most up to date information from Cefas, or add us to your network on LinkedIn

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Sarcocystis - A Potential Emerging Disease in Rainbow Trout
Fish Health Inspectorates, England & Wales, Scotland and Northern Ireland

You may have heard about a possible new parasitic disease diagnosed in freshwater farmed rainbow trout (*Oncorhynchus mykiss*) in Sweden. At present the exact cause and significance of this is not fully understood.

As a precautionary measure and as part of our responsibility to ensure the maintenance of the high health status of aquatic animals within the UK, the UK Government and the Devolved Administrations of Scotland, Wales and Northern Ireland are issuing the following information to advise you and raise awareness of this situation.

Points to note

- A possible new parasitic disease has been discovered in Sweden within two freshwater rainbow trout farms
- It is possible that infestation could occur in wild salmonids particularly in fish around affected fish farms
- The exact cause of the condition is unknown although histological studies indicate that the parasite is a protozoan, possibly of the Sarcocystidae family although this has yet to be confirmed
- Mortality has been reported as variable, but can be significant; up to 15% has been experienced in juvenile fish at approximately 1 month post hatching and of a length up to 2.5 cm at one of the sites associated with the condition
- Clinical signs which may be indicative of the disease include increased mortality, a black discolouration to the posterior section of the body and swelling over the dorsal surface of the head area (the cranium)
- There are no known direct trade links between the UK and Sweden in terms of live rainbow trout. The risk of infection via this route is believed therefore to be negligible
- Although the condition has only been reported from Sweden, the source and distribution of the parasite and any associated disease is presently unknown
- To date there is no indication that this parasite is present within rainbow trout stocks in the UK
- More work is needed before any definitive conclusions can be made about the identity of the causative agent of the mortality, its source and risk to UK trout stocks
- Currently, and until more information about the condition is obtained, the impact of the disease (e.g. level of mortality) is believed to be a production related condition
- The EU Commission and experts from member states with an interest in this issue (inc UK), recently held a meeting where it was concluded that the current level of risk did not yet warrant the introduction of official controls/movement restrictions at an EU level
- The EU-Reference Laboratory for fish diseases will continue to work with Swedish authorities in collecting further information on the suspected pathogen and epidemiology of the disease. A recent presentation by the Swedish authorities can be found at: http://ec.europa.eu/food/committees/regulatory/scfcah/animal_health/presentations/02072013_sarcocystis_parasite_swedish.pdf

Are there any human health risks?

There is currently no evidence from the Swedish authorities of any risk to human health.

What should I do?

There is a suggestion that clinical disease and mortality associated with the condition can be reduced through good husbandry practices. Maintaining a high level of biosecurity and implementing good stock management practices at your farm site will be beneficial in protecting the health and welfare of your fish. Further information on good husbandry practices and biosecurity can be found at:

- https://www.gov.uk/protecting-freshwater-fish-

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Sarcocystis - A Potential Emerging Disease in Rainbow Trout

and-other-aquaculture-species
- http://www.scotland.gov.uk/Resource/0038/00385854.pdf

Always seek appropriate health certification and assurances from any supplier of stock which you intend to use in relation to your farming operations.

If you suspect disease or experience mortality problems on your site then please contact the relevant Fish Health Inspectorate (details below) who can provide a diagnostic service and offer advice on biosecurity and best practice to minimise the potential spread of disease.

Your veterinarian or health manager should also be consulted and can assist with disease diagnosis and offer advice on biosecurity practices.

We will endeavour to keep you informed of any significant developments, if and when they become apparent.

Should you have any concerns, please do not hesitate to contact us.

Image showing clinically affected fish. Black discoloration of the posterior section of the body and swelling over the dorsal surface of the head area (the cranium) is visible. Image courtesy of Eva Jansson from the National Veterinary Institute of Sweden

England and Wales

The Fish Health Inspectorate
Centre for Environment, Fisheries & Aquaculture Science
The Nothe, Barrack Road, Weymouth, Dorset, DT4 8UB
Tel: 01305 206700
Email: fhi@cefas.co.uk

Scotland

The Fish Health Inspectorate, Marine Scotland
Marine Laboratory, 375 Victoria Road, PO Box 101, Aberdeen, AB11 9DB
Tel: 01224 876 544
Email: ms.fishhealth@scotland.gsi.gov.uk

Northern Ireland

The Fish Health Inspectorate
Department of Agriculture and Rural Development
Dundonald House, Upper Newtownards Road, Ballymiscaw, Belfast, BT4 3SB
Tel: 02890 524156 - Inspectorate
Email: fish.health@dardni.gov.uk

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Aquatic Animal Health (England and Wales) Regulations 2009 - Implementation of Regulation 18
Defra

The Aquatic Animal Health (England and Wales) Regulations 2009 which implement the European Union Council Directive 2008/88/EC provide the legislative framework for the control of serious diseases of fish, shellfish and crustaceans in England and Wales. Similar legislation is in place in Scotland and in Northern Ireland.

The implementation of Regulation 18 of the Aquatic Animal Health (England and Wales) Regulations 2009 has been delayed while consideration was given to the appropriate health status to declare in GB for the EU notifiable disease, koi herpesvirus (KHV). Regulation 18 provides additional safeguards to aquatic animal health.

Following a review of KHV disease controls Defra has decided to implement the provisions of Regulation 18 of the AAH Regulations. This will restrict the import of fish intended for stocking into the wild (or into managed fisheries) to those fish which come from sources which are declared disease free and which have not been vaccinated against any of the listed diseases (that is diseases listed in Annex IV of Council Directive 2006/88/EC and in the AAH Regulations).

A small number of businesses in England import live fish for the purpose of their introduction into the wild, generally for stocking angling waters. These businesses, should they wish to continue to import fish with a view to their introduction into the wild, will now need to source stock that meet our health certification requirements for freedom from listed diseases and are not vaccinated against these listed diseases.

The application of Regulation 18 will provide a valuable mechanism for the control of outbreaks of listed diseases, improve national biosecurity, and contribute to the protection of the high health status of GB.

In order to ensure that importers have time to revise their business models Defra will be bringing this change into effect from 1 April 2014.

All fish importers were notified about this change by letter in December 2013.

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EU Animal Health Regulation – what does it mean for aquatic animal health?
Defra

On 6th May 2013, the European Commission formally adopted a proposal for a new Regulation on Animal Health as part of the Smarter Rules for Safer Food package. The aim of the proposed Regulation, found at: http://ec.europa.eu/food/animal/animal-health-proposal-2013_en.htm is to establish a legal basis for a common EU animal health policy and a single, simplified, transparent and clear regulatory framework for animal health.

It will replace a complex set of more than forty Regulations and Directives, some of which date back almost half a century and will cover all aspects of animal health, including responsibilities, disease control, surveillance, bio-security, vaccination, imports, movements, and trade both in the terrestrial and the aquatic sectors.

The Commission has emphasised that the proposal is intended as 'evolution rather than revolution' and that most aspects of the current aquatic animal health regime will remain unchanged. Nonetheless, the package is a real opportunity to substantially simplify controls and make sure that they target the highest risks. Discussions on the proposal are ongoing in Council Working Groups and are expected to continue for some months before a common position is reached. The proposal is also being considered in the European Parliament, which intends to vote on it in March.

In addition to the new Regulation on Animal Health, the European Commission has also adopted, as part of the Smarter Rules for Safer Food package, a proposal on official controls which would replace Regulation 882/2004, found at: http://ec.europa.eu/food/food/controls/inspection_fees/index_en.htm).

This proposal aims to strengthen the enforcement of health and safety standards (such as inspections, audits, sampling and analysis) along the entire agri-food chain. It extends the current official controls regime to now fully include the plant health sector in addition to plant reproductive materials and plant protection products.

As with the animal health Regulation, we are looking for significant gains for better regulation and an evidence-based and outcome-focused approach that is flexible and not unduly prescriptive. Whilst we are keen that current controls are simplified, there are concerns about the Commission's plans to extend mandatory charging to cover all official controls, albeit with a requirement to exempt micro-enterprises. This would have a huge impact on the industry and we, like many other Member States, are keen to ensure that any changes to current systems and practices are proportionate and take account of the current economic conditions.

The Food Standards Agency (FSA), who lead on the negotiations for the revised official controls Regulation, launched a consultation to seek comments from stakeholders about the potential impact of the proposal. The consultation ran between October 2013 and January 2014. The documents can be found at: www.food.gov.uk/news-updates/consultations/consultations-uk/2013/officialcontrols-consult.

As with the animal health Regulation, we are working with MEPs and other Member States to share mutual concerns and aim to secure the best possible outcome from the negotiations for the UK. Whilst the FSA lead on this proposal, they are working closely with us in Defra, as we have responsibility for a number of policy areas within it. As such, both the FSA and Defra have already been in touch with numerous stakeholders about this consultation to ensure that they are aware of what this proposal might mean for them and ensure that their views are represented.

It is difficult to be entirely certain when negotiations on the package proposals will be concluded and when the new regulations will be implemented. The European Parliament elections next May and the European Commission refresh in September make both the timescales involved and the extent to which the proposals in the package will change uncertain. The UK Government will continue to ensure that UK interests are represented in negotiations on all of the proposals making up the Smarter Rules for Safer Food package.

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Status of notifiable fish diseases in England and Wales – 2012

Kevin Denham, Fish Health Inspectorate, Cefas

Great Britain has a high fish health status, being free from many serious fish diseases. The Cefas Fish Health Inspectorate (FHI) acts to maintain this status as the official service responsible for the control of serious diseases of aquatic animals in England and Wales. The diseases of concern are principally those listed in European legislation in Council Directive 2006/88/EC, and nationally controlled diseases listed in the Aquatic Animal Health (England and Wales) Regulations 2009 as amended.

The FHI implement an active surveillance programme on fish farms (aquaculture production businesses, APBs) for all listed diseases, with each farm receiving a minimum of one inspection per year. The FHI also works closely with fish farmers, veterinarians, fish health consultants and the Environment Agency (EA) to ensure an effective passive surveillance system for aquatic animal diseases. In addition, the FHI works with Border Inspection Posts (BIPs) and fish importers to prevent introduction of fish diseases to GB.

The FHI remit also extends to the investigation of new and emerging diseases, not covered by EU or national controls.

Diseases exotic to the EU

Epizootic ulcerative syndrome (EUS)

EUS is a fungal disease caused by *Aphanomyces invadans* which infects a wide range of fish species in tropical and sub-tropical parts of the world. EUS was included as a listed disease in the aquatic animal health directive 2006/88/EC due to concerns that the disease had the potential to cause significant economic impact if introduced into the European Union.

Due to concerns expressed by Member States that the disease may not pose risks to European aquaculture, the European Food Safety Authority (EFSA) was asked to provide a scientific opinion on EUS. EFSA is a European agency funded by the EU to provide independent scientific advice on food and feed safety. EFSA concluded that the impact of EUS on aquaculture in the EU would range from no impact to low impact. In addition it was also concluded that the disease was likely to have entered the EU repeatedly through the import of ornamental fish, and as no outbreaks of EUS have been reported in the EU, there was no evidence to suggest that EUS has the potential for detrimental environmental impact. In 2012 the European Commission published Commission Implementing Directive 2012/31/EU which removed EUS from the list of controlled diseases in aquatic animals.

Whilst EUS is no longer a controlled disease, the Cefas Weymouth laboratory will retain the capability for the diagnosis of the disease, and will continue to investigate suspicion of infection in both imported fish and in our indigenous fish stocks.

Epizootic haemorrhagic necrosis (EHN)

EHN is a viral disease affecting rainbow trout and perch. No evidence was found for the presence of this virus during surveillance of fish farms holding susceptible species.

Non-exotic diseases to the EU

Infectious haemorrhagic necrosis (IHN), viral haemorrhagic septicaemia (VHS) and infectious salmon anaemia (ISA)

All fish farms holding susceptible species to these three highly virulent viruses were subject to surveillance and no evidence was found for their presence.

Koi herpesvirus disease (KHV)

The second wettest summer since records began combined with low temperatures appeared to delay the onset of koi herpesvirus disease in managed fisheries in England. In previous years, the FHI generally received reports of suspicion of KHV disease in late June or early

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July. However in 2013 the first reports were not received until late July.

A total of 6 fisheries were subject to confirmed designation for KHV during 2012. These resulted from mortality investigations undertaken by the FHI often in conjunction with the EA. Copies of the confirmed designations are posted on the Defra website (www.defra.gov.uk/aahm/disease/). The FHI undertakes regular follow-up visits to infected sites to ensure that appropriate biosecurity measures were implemented and to offer advice to the fishery managers. These infected fisheries will be subject to disease surveillance for a minimum period of four years before the confirmed designations are reviewed.

The confirmed designation placed on Morehall Fishery in South Yorkshire was complicated by the fact that the lease for the operation of the fishery expired and planning permission had been obtained for the development of a sewage treatment plant on the site. As a condition of the confirmed designation prohibited the movement of live fish from the site, the Fish Health Inspectorate with the cooperation of the Environment Agency undertook a humane cull of the remaining fish stocks prior to the drain down of the site.

In accordance with the current KHV disease control policy, sentinel fish were introduced into fisheries that had tested positive for KHV in 2008 and 2009. The fish

were left on site for a minimum of 4 weeks before being tested for KHV by genetic sequencing. As a result of the sentinel fish programme, 9 Confirmed Designations were removed from fisheries that had successfully completed the 4 year surveillance and testing programme. Sentinel fish on two fisheries proved to be positive for KHV disease, and as a result these fisheries are required to restart the surveillance programme from year one.

As in previous years, the KHV disease surveillance programme on fish farms holding susceptible species revealed no evidence for the presence of the disease in the aquaculture sector.

A spot check by a Fish Health Inspector on coldwater ornamental fish at a retail premises resulted in suspicion of KHV disease in the stocks. This suspicion was confirmed in diagnostic tests and the fish stocks were humanely destroyed and the premises subjected to a supervised disinfection.

Nationally controlled diseases

Gyrodactylus salaris

GB is free from the skin fluke *G. salaris*, the parasite responsible for the dramatic decline of Atlantic salmon in Norway. All fish farms holding susceptible species are subject to active surveillance. In 2012, 179 fish farms were inspected for the parasite, and no evidence was found for its presence. In addition, the major river catchments in England and Wales with Atlantic salmon populations are tested for *G. salaris* on a 5 year rolling programme: 6 river catchments were tested in 2012, and no evidence was found for its presence. The level of sampling undertaken in 2012 was lower than in previous years due to water conditions in most river catchments during the sampling period.

Bacterial kidney disease (BKD)

In February 2011, Defra and Scottish Government approved a new strategy for the control of BKD in GB

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Status of notifiable fish diseases in England and Wales – 2012

through domestic control measures. The new measures replaced existing national controls (colloquially known as additional guarantees) in place since 2004 under Commission Decision 2004/453/EC. BKD remains a notifiable disease, but statutory controls are only be applied in cases of clinical disease.

In 2012 there was no suspicion of clinical BKD on fish farms in England and Wales. There remains one fish farm currently designated for BKD in England.

Spring viraemia of carp (SVC)

In 2010 GB achieved recognition of freedom from SVC. Surveillance and controls are maintained to support this status.

An import check programme on SVC susceptible species is organized to coincide with the increase in number of fish brought into the UK in early spring. During 2012, 36 samples of coldwater ornamental fish were examined for the presence of SVC at the point of import. Samples are selected using a number of criteria including the volume of trade from the exporting country, new sources of fish, and the results of historical diagnostic testing. No evidence of SVC was found in the import samples. This is the first year since 2007 that SVC has not been detected in imported fish.

In order to reduce the impact of the introduction of disease with imported fish, FHI Inspectors have continued to work with the ornamental fish sector to improve biosecurity measures plans (BMPs), in particular contingency measures for the detention and isolation of fish subject to regulatory notices. The implementation of such measures by businesses provides a greater level of protection against losses due to the introduction of diseases with imported fish.

New and emerging diseases

The remit of the FHI extends to the investigation of new and emerging diseases that have the potential to detrimentally affect farmed or wild aquatic animals. The World Organisation for Animal Health (OIE) define emerging diseases as a newly recognised infection resulting from the evolution or change of an existing pathogenic agent, a known infection spreading to a new geographic area or population, or a previously unrecognised pathogenic agent or a disease diagnosed for the first time and which has a significant impact on aquatic animal or public health. Investigations into disease events in 2012 included the following:

CEV (carp edema virus) –like virus

In early Spring 2012 the Fish Health Inspectorate investigated a major mortality event involving common carp at a lake in south-east England. Affected fish exhibited sunken eyes, skin lesions and gill damage. Diagnostic tests eliminated the listed diseases as the cause of the mortality but identified the presence of a virus in the affected fish. This virus, whilst having some similarities to carp edema virus (CEV, a pox virus found in ornamental koi which is the causative agent of koi sleepy disease), exhibited sufficient differences in the genome to indicate that this was a different virus.

This virus has subsequently been associated with mortalities of common carp in a small number of fisheries in south-east England and in the Midlands. Work is currently underway to establish whether this virus is a contributory factor in spring carp mortality syndrome (unexplained mortalities in common carp in fisheries). Testing for CEV-like virus has now been incorporated into the standard suite of diagnostic tests undertaken by the FHI when investigating coarse fish mortality events.

A full report on the work that Cefas has completed on CEV-like virus can be found elsewhere in this edition of *Finfish News*.

Contingency Planning

Contingency planning in the event of an emergency - such as the introduction of an exotic disease - provides one of the essential elements in protecting the

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Status of notifiable fish diseases in England and Wales – 2012

aquatic animal health status of the UK. The aquatic animal health contingency plan for England and Wales (Scotland has its own plan) forms an element of wider national contingency and emergency plans managed by Defra. The contingency plan is reviewed on a regular basis. In addition, in order to test the effectiveness of the plan and the preparedness of staff, regular exercises are undertaken.

In March 2012 an exercise was conducted to test elements of the contingency plan for aquatic animal diseases which involved Defra, Cefas, the Environment Agency, and Welsh Government. A hypothetical outbreak of an exotic fish disease was used as the basis of the exercise, with a NDCC (National Disease Control Centre) established at the Cefas Weymouth laboratory, with the exercise including amber/red teleconferences, policy and bird-table meetings. The contingency exercise was considered a success, with lessons learned during the exercise incorporated into an updated contingency plan.

This event forms part of regular programme of exercises to ensure that the FHI and other agencies are fully prepared in the event of an outbreak of a serious aquatic animal disease within the UK.

Contacting the FHI

An effective passive surveillance system for aquatic animal diseases is reliant on observations of fish disease and mortality being reported promptly for investigation. Fish production businesses are also reminded of their legal obligation to report unexplained mortality events, and suspicions of a clinical outbreak of a notifiable fish disease. Please report observations of fish disease and mortality to the Fish Health Inspectorate on 01305 206600.

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Fish Health Inspectorate Citizen's Charter Performance Results 2012/13

David Smith, Fish Health Inspectorate, Cefas

The Fish Health Inspectorate's (FHI) purpose is to prevent the introduction and spread of fish and shellfish diseases within England and Wales. This involves implementing European Union Fish Health Directives and administering and enforcing national legislation. In undertaking these tasks, the FHI aims to provide an efficient and high quality service.

We are constantly looking for ways to improve the service we provide. One method we use is the Citizen's Charter, which tracks the response times of all our actions. We are required to publish an annual summary of our performance against targets. The results are reported in the Cefas publications '*Finfish News*' and '*Shellfish News*', which are available on www.cefas.defra.gov.uk. A copy of our Citizen's Charter is also available on the website.

The following report shows our performance against our target of 95% for the period 1 April 2012 to 31 March 2013.

In addition the FHI undertook a yearly renewal of 99 importer authorisations. These were for scientific research, tropical, public display and *Garra rufa* importers. This ensured all data we hold for the sites was correct, and any unused licences were revoked.

Also during this period our joint Environment Agency and FHI website (www.defra.gov.uk/aahm/) received 45,655 visits

Customer care helpline

In carrying out our work, we aim to ensure that you receive a high quality, cost effective service so that we minimise our impact on your time. The best way for us to measure our performance is to receive feedback from people who require our services.

To help us achieve this, we have a Customer Care Helpline on 01305 206700 where all complaints will be recorded and thoroughly and impartially investigated. Our helpline staff will assist you with your problem and will explain our complaints procedure in full. You will be given a reply within 15 working days.

The Inspectorate also runs a customer satisfaction survey throughout the year. The survey questionnaire is provided to operators during their routine inspections. The survey is voluntary and the results are kept anonymous. The results are reported in *Finfish News* annually.

	Totals	Achieved in 2012-13
Correspondence **Target**: Reply to all letters, emails, applications, faxes and complaints within 15 working days of receipt.	Emails: 4,639 Calls: 4,946	99%
Movement document applications **Target**: Respond to all requests for movement documents, provided 5 working days' notice is given.	Export requests: 751	100%
Registration of Fisheries and Cropping Waters **Target**: Complete all registration administration within 15 working days	Applications: 986	100%
Reporting of test results and visit summaries **Target**: Provide a follow-up letter within 15 working days to advise farmers in writing of any points raised during the visit. Also the FHI must report all negative test results within 15 working days of the full results becoming available and give a verbal report within 1 working day where a notifiable disease is found.	Visit summaries: 1,348	62%
Overall results The overall compliance rate with our set targets.		90%

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Fish Health Inspectorate (FHI) customer satisfaction survey results

David Smith, Fish Health Inspectorate, Cefas

This is the second year we have run the FHI customer satisfaction survey. Feedback we received in the first year resulted in changes to our procedures. We also still run the Customer Care Helpline (01305 206700), which can be used to lodge formal complaints or provide positive feedback.

The customer satisfaction survey complements our Citizen charter by allowing aquaculture production business (APB) operators to provide anonymous feedback about the quality of the inspections they receive. The survey form's layout and questions have been refined to make it easier to complete following last year's feedback. It now contains ten short questions about our field inspectors' service delivery split across two themes: behaviours and professionalism. It also allows for additional comments not covered by our questions.

This survey ensures we have a formal feedback mechanism in line with the Hampton Implementation Review recommendations and our UKAS accreditation. Inspectors were encouraged to ask every operator to complete the anonymous survey during their visits.

We would like to thank all the operators for taking time to provide feedback. We analyse all feedback to help us continuously improve our processes and prioritise training requirements for inspectors, which allows us to provide a better service to you.

Finally, we investigated the possibility of introducing an electronic feedback system for the support that the Aquatic Trade and Technical Advice team provides to the industry. However the evaluated solutions were expensive and complex. This has therefore been postponed until a better option can be found.

Actions on last year's feedback

Last year's survey results were used to improve three areas:

- Timekeeping – All inspectors' letters explain the visit schedule. This includes the time the inspector will arrive and an estimate of how long a visit will last.
- Hygiene protocols – Our standard operating procedures for disinfection before entry to, and on exiting, a site can now be seen upon request.
- APB movement record keeping – We reviewed the requirements for record keeping and have created an easier to complete electronic movement record form, which is available from our website (www.defra.gov.uk/aahm/files/finfish-movement-records.xls). We are also investigating the possibility of recording movements using smart phones or online.

Results 2012/13

A total of 149 questionnaires were distributed by inspectors during their visits, an increase of over 30 from last year. Completion of the questionnaires was voluntary, and respondents were assured that all responses would remain anonymous. We received 105 completed forms – a 70% response rate, which is up 5% from last year.

Scoring was based on a scale of 1 to 5, with 1 being poor and 5 being excellent. The overall average score was 4.95, representing 99% satisfaction, up by 3% compared to last year. The average scores for the different aspects of the field inspectors' service delivery are provided in the tables for both years.

Additional comments

In total 36 comments were received, and a selection are reproduced below. The comments fell between two themes: praise and suggestions for improvements.

Praise

- "We have always found our inspectors to be approachable and helpful. We have no complaints at all with the service."
- "My having had some 60 years of farming experience, I have to say that I have never in my dealings with various areas of Authority met one with the QUALITY of CEFAS OFFICERs for which I always

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Fish Health Inspectorate (FHI) customer satisfaction survey results

Behaviours

	Average Result 2011/12	Average Result 2012/13
The inspector's patience	4.82	4.95
The inspector's enthusiasm	4.85	4.94
The inspector's ability to listen carefully	4.79	4.96
The inspector's friendliness	4.83	4.96
The inspector's helpfulness	4.83	4.98
Overall average	**4.82**	**4.96**

Professionalism

	Average Result 2011/12	Average Result 2012/13
The inspector's level of knowledge	4.79	4.95
The inspector's quality of advice	4.82	4.94
The inspector's ability to resolve issues	4.84	4.91
The inspector's promptness	4.68	4.86
The inspector's overall professionalism	4.86	4.97
Overall average	**4.80**	**4.93**

Scoring was based on a scale of 1 to 5, with 1 being poor and 5 being excellent

thank them."

- "Inspector very helpful with questions asked, the occasional question asked (maybe questions not directly associated with the FHI's remits) they directed to where or to who I could get the answer from"
- "Friendly, helpful, professional - excellent all round"

Suggestions for improvements

- "All of my meetings with FHI inspectors have always been interesting and meaningful. My only wish is that whenever there is a reported case of KHV either at a dealer and/or hobbyist, all koi importers should be notified who are on the Cefas importer list"
- "Better format of movement books"

Follow-up actions

From the suggestions and comments the main themes for improvement revolve around two areas:

- Movement records – as explained earlier we have improved this area already and continue to investigate other improvements. However we are limited by requirements in legislation to the level which we can minimise record keeping.
- Better notification in the event of fish disease outbreaks – we are investigating using new mapping techniques and communication channels to broadcast updates about disease outbreaks. We currently provide early disease alert notifications on our website: www.defra.gov.uk/aahm/news/. Confirmed disease designations are also available to view online: www.defra.gov.uk/aahm/disease/

Industry News

Marine Finfish Farming Opportunity: Demonstration Project in Southwest England

Cefas, BTA and The Crown Estate

The Centre for Environment, Fisheries & Aquaculture Science (Cefas), the British Trout Association (BTA) and The Crown Estate (TCE) have formed a Project Team to work jointly on a demonstration project addressing the sustainable production of marine finfish in English waters.

Expressions of Interest (EoI) are invited from within the aquaculture industry to work with this team to demonstrate the potential for net-pen production of rainbow trout in marine waters of SW England. The model proposed is one where an aquaculture industry partner will operate the site as an independent business while the Project Team, led by Cefas, will monitor the sustainability of the operation. Cefas will collect and report scientific data on a range of subjects including environmental impact and fish health.

Background

Marine finfish aquaculture in the UK is dominated by net-pen production in Scottish coastal waters, with a total production of 158,018 tonnes worth £584.7 million at farm-gate prices in 2011 (see www.scotland.gov.uk/Topics/marine/Fish- Shellfish/FactsandFigures). In direct contrast, English finfish aquaculture has not developed to the same level, with only c.8,000 tonnes of (principally) rainbow trout production in 2009 – all from freshwater systems. Currently there is no finfish produced in southern UK coastal marine waters.

The Project Team recognise that aquaculture has potential for sustainable development in England. The drivers for potential expansion occur at three levels:

- International: e.g. themes emanating from the FAO Global Conference on Aquaculture 2010 (see www.aqua- conference2010.org/fileadmin/user_upload/gca/media/GCA%202010%20-%20Thematic%20Recommendations%20-%20Final%20-%2014-12-10.pdf)
- European: Common Fisheries Policy reform (see http://eur- lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52011PC0425:EN:NOT) and Blue Growth (http://ec.europa.eu/maritimeaffairs/policy/blue_growth/documents/com_2012_494_en.pdf)
- National: the Defra-facilitated English Aquaculture Strategy consultation (see www.gov.uk/government/consultations/planning-for-sustainable-growth-in-the- english-aquaculture-industry).

This demonstration project will generate data that will broadly validate the principles and application of the methodology of marine finfish farming to a species the project team considers to have potential for production in English waters.

For this project, large marine-grown rainbow trout (>2.5kg) are the species of choice, reflecting the participation and interests of the BTA as a project partner. The Project Team believe that there is sufficient understanding of the farming principles, technical knowledge and expertise, and scope within the market for an enterprise producing this species in a net-pen system to be viable in waters of the SW.

This project will investigate the social, economic and environmental sustainability of marine trout farming in English waters as a proxy for other marine finfish developments in the region. Using various scientific models that shall be developed by Cefas, the information generated from the project will support future marine finfish aquaculture development. The data generated will also be fed into the marine spatial planning process and help to identify future marine finfish opportunities around the southern coastline of the UK.

This demonstration project will also develop a clear pathway through the planning and licensing process for marine finfish aquaculture in English waters, which is largely untested and extremely complex. Regulatory burden was recognised by the English Aquaculture Consultation Group as one of the constraints to the development of the sector, and this project will address at least one of the components

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Marine Finfish Farming Opportunity: Demonstration Project in Southwest England

of the regulations. The Project Team will consider the current system and make recommendations for improvements and more efficient practice for both industry applicants and regulators in the future.

Some preliminary work has already begun: the Project Team has held policy-level discussions with several organisations that would be involved with the applications process – such as the Marine Management Organisation, Natural England and the Environment Agency. Their views about the project's concept and general approach were sought and these organisations have provided "in principle" support for the model outlined in this document.

Cefas will concentrate its scientific expertise on environmental impact, fish health and welfare, and broader socio-economic impacts on local fisheries and seafood supply chain. This work will be independently funded, with a number of different opportunities already identified.

The Concept

The Project Team intends to use this demonstration project as a platform to:

1. Establish clarity in the marine finfish licensing process in England;
2. Produce recommendations for any improvements to that process, which may improve the efficiency of applications;
3. Develop a scientific evidence base of environmental impact for marine finfish and specifically rainbow trout) production in English waters.

The demonstration project is expected to run for a period of up to ten years. This will enable the Project Team to extract meaningful scientific data and manage long-term datasets relating to environmental impact.

Site selection

The successfully appointed aquaculture business (the Operator) will work closely with the Project Team, and especially Cefas, to identify the specific location in marine waters off Cornwall for the demonstration site. It is important that the demonstration site is one that suits the Operator's business model as well as the aims of this project.

The size of the demonstration site is critical: it must support an operation that demonstrates proof of concept for UK industry in SW waters. It is likely, therefore, that it would be in excess of 1,000 tonnes per annum production. A site of this size would provide meaningful environmental management data and show economic independence and sustainability at a commercial scale.

The Project Team expects that the site will be located sensitively, respecting the interests of other local stakeholders. For instance, it would not be located within an estuarine environment but rather in more open coastal areas.

Licences and other permissions

Cefas, on behalf of the Project Team, will apply for and hold the marine licence, the TCE seabed lease and

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Marine Finfish Farming Opportunity: Demonstration Project in Southwest England

possibly some of the other permissions (to be agreed in discussion with the Operator) covering a pilot marine farm producing large rainbow trout in a net-pen facility of a size comparable to other marine finfish (salmon and trout) sites currently located in Scottish waters.

Licence applications will require the full engagement of the Operator in this process, as permissions secured will need to be appropriate to the Operator's requirements and vision for the site's production.

There is a strong likelihood that permissions for the demonstration site would transfer to the Operator at the end of the ten-year agreement period. An appropriate process for hand-over will be defined in due course.

Managing the project

The Operator will manage site operations on a commercial basis, under terms and conditions stated within a formal Management Agreement (MA) and any other required licences and permits that are not taken on by Cefas.

The MA will, first and foremost, secure operations to the level required by the relevant regulations. Liability for risks associated with the Operator's financial solvency will also be covered within the wording of the MA, amongst other matters.

Otherwise, the Operator will have sole responsibility and economic freedom for managing the farm, including scheduling production and growing fish through to harvest. Commercial independence is viewed as a necessity since this status will test the social and economic sustainability of the development. The Project Team will make no contribution to the aquaculture operation itself.

A Steering Group (SG) – comprising the Operator, Cefas, BTA, TCE, the Cornwall Inshore Fisheries and Conservation Authority and other stakeholders – will be established to review the project's performance. Their remit will cover the scientific data collated and reported by Cefas, thus ensuring that the site operates to sound environmental and technical standards under the MA. The SG may also invite recognised experts on various subjects appropriate to this project to review the demonstration site's operational processes. A central tenet of the SG is the open sharing of scientific data and information in promoting constructive dialogue between all parties.

Timescale

Interested potential candidates should submit their written response by 31 October 2013 to finfishproject@cefas.co.uk. Initial registrations of interest will be screened and those successful shall be invited to an Information Day where potential candidates will be provided further information on the aims of the project, along with additional information on the selection process.

Informal approaches for further information may be made to members of the Project

Team

- Neil Auchterlonie, Cefas: 01305 206600 and 07500 063269
- David Bassett, BTA: 0131 472 4080
- Alex Adrian, TCE: 0131 260 6076

Industry News

New aquaculture facilities opened at Sparsholt College
Marine Management Organisation

Sparsholt College has officially opened its £500,000 Salmonid Rearing and Trials Centre, a teaching and research centre that aims to help bolster the UK's aquaculture industry. The centre will be used for education and research but will also give fishery students a chance to develop their commercial and entrepreneurial skills.

The European Fisheries Fund (EFF) is supporting the development of the aquaculture industry in England by investing in education and training facilities for its future workforce. An EFF grant of over £240,000 was awarded to the college to part fund the project.

Winchester and Chandler's Ford MP Steve Brine and Robert Hughes from aquaculture feeds producer Skretting, who is also an ambassador and campaigner for the UK Trout industry, unveiled the plaque on Thursday 31 January 2013. During the opening the college also hosted the national launch of the Fish Husbandry and Fishery Management Apprenticeship, a brand new qualification.

The new centre will be used primarily as an educational facility but also has significant potential as a research facility as well as supporting some local fisheries' re-stocking programmes. The new building incorporates a small aquaculture unit to produce table fish which will increase the students' commercial and entrepreneurial experience and there is the potential to provide training for the aquaculture industry.

Image provided by Sparsholt College

Caroline James, Learning Manager for Fishery Studies, said "We see this facility as an opportunity to educate and provide relevant employability skills as well as developing our research and trials basis. Progression into either employment or continuing in education will be enhanced for our students and we are proud that we provide education and training for all levels.

"The award from EFF towards the cost of the new Salmonid Rearing and Trials Centre has enabled the college to build a state of the art facility which includes a range of teaching and training resources alongside the research unit. Students and our industry partners are already making good use of the centre and without the financial support we received from the EFF the centre is likely to have been much more limited in the opportunities it is able to offer. The application process was quite straightforward and we received plenty of support when we had any queries, other businesses in the aquaculture industry should consider applying for this funding."

Through the EFF funding may be available towards aquaculture products for human consumption, particularly species which are not widely produced and those for which demand is currently exceeding supply. The grants may also support projects benefitting groups within the industry, such as towards creating producer organisations and improving management of fishing areas.

For more information on applying for EFF grants visit: www.marinemanagement.org.uk/fisheries/funding/eff.htm.

If you need advice on whether your application should be considered by the panel or for general advice on the application process please contact the EFF Team at the Marine Management Organisation on 0300 123 1032.

For further information regarding the new Fish Husbandry and Fishery Management Apprenticeship or any other Fishery courses offered at Sparsholt College please visit www.sparsholt.ac.uk or call 01962 776 441.

Industry News

Changes to the regulation of non-native fish under the Import of Live Fish Act 1980

Alasdair Scott, Cefas

Introduction

The Import of Live Fish Act 1980 (ILFA) enables the relevant minister, by Order, to prohibit the import, keeping and release of any non-native fish species, except under licence, where that species may pose a risk to freshwater fish, shellfish, salmon or their habitats. Two such Orders have previously been made in England and Wales: the first, which came into force in 1996, prohibited the keeping of all non-native crayfish species; the second, made in 1998 and amended in 2003, prohibited the keeping and release of a small number of freshwater fish species.

The species listed under these Orders are subject to a variety of licensing conditions which dictate where and for what purposes they can be kept or released, and these conditions reflect both the risk the species are considered to pose of becoming established in GB waters, and the extent to which they were already traded within England and Wales at the time the Orders came into force.

The number of fish species requiring regulation under ILFA was low because UK aquatic animal health rules had prevented the import of the vast majority of temperate species that could pose a threat to our native species and habitats. Of the 41 listed species or genera, 27 were readily available through the ornamental fish industry, before the Order came into force. The Order was used to prohibit the keeping of 22 of these, for trade as ornamental animals, while the other 5 were subject to licensing that restricted the situations in which those species could be kept. The 14 remaining species or genera were either species that had been previously introduced to fishery waters in England and Wales, which warranted restrictive licensing to prevent their further spread, or were relatives of native species considered to pose a high risk of causing harm if introduced, the keeping of which would be prohibited in all but the most secure conditions.

Following the harmonisation of aquatic animal health rules across the EU, the opportunity to import potentially harmful freshwater fish species into Great Britain increased dramatically. Given that it is widely believed introductions of non-native species pose a threat to native biodiversity, second only to the threat posed by climate change, it was clear that this situation needed to be addressed.

The European Commission recognised the threat posed by the introduction and movement of non-native species for aquaculture, and introduced controls under EC Regulation 708/2007, which replaced UK controls under ILFA for this sector. This Regulation did not however legislate for the risks posed by other sectors, most notably the ornamental trade, which moves a far wider range of fish species than any other. Following advice from Defra, Government has chosen to extend the use of ILFA, to manage the increased risk posed by an unrestricted trade in fish species.

Why did Defra seek further regulation of trade in non-native freshwater fish species?

There is clear evidence that certain fish species available in trade have been released into open waters in the UK, either deliberately or accidently, where they have been able to establish populations. In some of these cases, the introduced fish (e.g. topmouth gudgeon *Pseudorasbora parva*) has proven to be invasive and damaging to the native fish stocks in some of the waters in which it has become established. This has resulted in the species being subject to a costly eradication programme operated by the Environment Agency. There are also other risks to consider with the release of invasive non-native species including their impact on native biodiversity and fish populations through predation, disease, displacement and competition.

The evidence makes two things clear:

1. There is a significant risk of the establishment of temperate ornamental species in natural waters in circumstances where:
   a. They are well known to survive in UK waters (they

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Changes to the regulation of non-native fish under the Import of Live Fish Act 1980

Alasdair Scott, Cefas

are sold as pond fish)

b. They reach sizes or ages that prompt owners to discard them, or that make them attractive to the angling industry
c. They are deliberately and/or accidentally placed in waters with sufficient stock density to establish a breeding population.

These are sufficient grounds on which to adopt a precautionary approach to further expansion of trade in temperate species for ornamental keeping until it can be demonstrated by a risk assessment that further trade poses minimal risks to native fish populations.

4. There is a much lower risk that sub-tropical or even temperate ornamental species will be released and become established in GB where those species are routinely kept in indoor aquarium facilities. While there is evidence that some of these species will readily establish in suitable outdoor conditions, there is evidence from a long history of trade that aquarium species are rarely discarded in numbers that could lead to population establishment or other adverse impacts on native biodiversity; and generally they are not a target for diversion of use like the typical pond fish.

It was concluded that the most appropriate course of action was to seek to prevent any further expansion in the range of species available to the coldwater pond fish industry, while allowing the ornamental aquarium trade to continue to supply large numbers of low risk species to its customers.

How did Defra choose to list species under the new Order?

There are two basic approaches to the establishment of controls on non-native species:

1. Species are subject to control only where they are known to be invasive or are shown by a comprehensive risk assessment to be likely to become invasive.
2. Species are subject to control on a precautionary basis and are freed from controls where a comprehensive risk assessment demonstrates that they pose little or no risk of becoming invasive. This option is favoured by conservation bodies and governments as it reduces the risk that a species will unexpectedly become invasive, and it transfers the costs to industry to justify the introduction of any new species they wish to trade. This is consistent with existing risk controls already established in other industries.

Considering both available options, Defra accounted for a number of important factors such as minimising the impact on industry, minimising the cost to government, and dealing with the lack of scientific data suitable to generate risk assessments with a high probability of an accurate result.

Development of a list of candidate species for keeping in indoor aquaria

The Fish Health Inspectorate at Cefas was asked to produce the list of species deemed suitable for keeping under licence in indoor aquaria. There were several key areas of information that determined whether a species or its relatives would be proposed for listing.

Evidence of which freshwater fish species are traded globally as ornamental animals

Ornamental Fish International, a trade body representing the aquatics industry worldwide, publishes a book, 'Standard names for freshwater fishes in the Ornamental Aquatic Industry', which gives comprehensive coverage of the fish species commercially traded by the global ornamental industry. This was used by Cefas as the starting point for the listing of ornamental fish suitable for keeping in indoor ornamental aquaria in England and Wales.

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Alasdair Scott, Cefas

Evidence of long term trade in GB of species from different areas of the world

Many species have been traded within GB for 80 or more years, and this provided substantial evidence regarding: the species that are typically confined to keeping in indoor facilities; those which are promoted for outdoor keeping; the nature and origin of those species likely to be discarded or released into natural waters.

Evidence regarding species that have become established and invasive in other countries

A number of commonly traded species have become established and invasive in other countries, which provides valuable information on the routes of entry and scope for establishment, in environments similar to those in GB.

The geographic origin of a species, and its relatives

By understanding the origin of species that have been kept securely within the aquarium trade for many years, it is possible to identify other species from a similar range of habitats that may be suitable for such keeping. In addition, where there is little information on the biological factors which may limit (or enhance) the ability of species to survive in GB, then the distribution of related species has been used to determine whether a given species is likely to be adapted to warmer or colder environments.

Data on water temperature ranges within certain geographic areas, and on the typical seasonal breeding dynamics of a range of fish species within these areas, were used, where available, to further refine the initial assessments made on the basis of geography and climatic zone.

Enforcement issues

There is little point in practical terms legislating against a single species that is almost indistinguishable from related species, which are allowed to be traded freely. As a consequence the proposed list does in some cases include species that would be able to survive in GB, in order to allow trade in the majority of related species, which pose little risk. There are also cases where the reverse situation applies, and a species of low risk is not listed because it is hard to distinguish from one of larger number of its relatives that pose significant risk, particularly where there is no history of trade in the species concerned to GB.

The assessment showed that most fish could be listed at genus level, with only a small number of genera containing species that cover a broad variety of habitat types such that some can be listed while others pose an excessive risk. The list produced by the FHI was presented to and discussed with OATA and OFI, and with relatively minor amendment was agreed to provide a sound basis for the future conduct of the aquarium trade in GB, based on the information available at the time it was compiled.

The list of genera/species licensed for keeping in indoor aquaria is available for scrutiny in two forms on the Defra website at www.defra.gov.uk/aahm/2014/02/13/non-native-update/:

- One version provides an alphabetical listing of taxonomic orders;
- The second, to allow a rapid check on whether a given species can be kept or not, is an alphabetical listing at genus level

The new ILFA Order and its provisions

The new Order, entitled The Prohibition of Keeping and Release of Live Fish (Specified Species) (England) Order 2014, prohibits the keeping and release in England of non-native freshwater species from 31 taxonomic orders. This means that all such fish can only be kept under licence. The only non-native species in these taxonomic orders that are exempted from control are species with a long history of release and widespread use in waters in Great Britain, namely rainbow trout (*Oncorhynchus mykiss*), common carp (*Cyprinus carpio*), goldfish (*Carassius auratus*) and orfe (*Leuciscus idus*).

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Changes to the regulation of non-native fish under the Import of Live Fish Act 1980

Alasdair Scott, Cefas

One consequence of the increased listing of species has been the requirement for Defra to identify which of these species can be licensed for use in particular industries, and how best to operate the licensing system to minimise the regulatory burden placed on the industry and public wishing to keep lower risk non-native fish.

A range of licence options exist, from individual licences that enable a named person or organisation to keep a particular species in a specified location, through to a general licence that allows anyone to keep a specified range of species under appropriate conditions. The key sectors affected are; fisheries operating in inland waters; the ornamental fish industry and hobbyists; zoos and public aquaria and the scientific research sector. The new provisions will also affect the keeping of live non-native fish for human consumption in wholesale and retail premises, a very small but potentially expanding industry.

As under the previous ILFA Orders, individual licences will initially be used to regulate the keeping of brook trout (*Salvelinus fontinalis*), grass carp (*Ctenopharyngodon idella*), zander (*Sander lucioperca*) and wels catfish (*Silurus glanis*) in fisheries and other inland waters. (Such licensing will transfer from ILFA when Defra harmonises the controls on movements of non-native fish with those for the stocking of native fish in inland waters later in 2014.) Individual licenses will also be used to enable organisations such as zoos and public aquaria to keep, for display, species that would not be suitable for the wider ornamental trade.

Three general licences have been used to specify which fish species can be freely traded and kept as ornamental animals. The first general licence, discussed earlier, enables the keeping of a large range of tropical, sub tropical and some temperate species in indoor aquaria both for ornamental purposes and for scientific research.

The second general licence will enable the keeping of a small number of coldwater species in both indoor aquaria and outdoor garden ponds for the same purposes. The licensed coldwater species are those which have been established in the pond trade for an extended period, namely grass carp and sturgeon (species of the genera *Acipenser* or *Huso*). The channel catfish and other species of the Genera *Ictalurus* and *Ameiurus*, which could be kept for ornamental purposes under the previous ILFA Order, will no longer be allowed to be kept as ornamental animals under general licence. There is a policy presumption against the issue of licences to keep any other coldwater fish as ornamental animals, and a similar presumption against licensing the release of any other non-native fish into inland waters.

The third general licence is for marine species that have been accidentally captured under the taxonomic orders of fish. The general licence for marine species will end when the legislation is amended later in 2014 as it needs to be legally specified that ILFA does not apply to marine species. This is a temporary measure to provide industry with protection and ensures any ornamental trade in marine species can continue unimpeded until such time the legislation is amended.

Anyone wanting to keep a non-native freshwater fish species other than in accordance with the above general licences, will need to apply for an individual licence (guidance and application form available at: www.defra.gov.uk/aahm/). Given the policy aim to prohibit the keeping of any non-native species in conditions where they may pose a risk to native species, it is likely that licence applications will only be issued for keeping in fully secure premises, or where the applicant can demonstrate through a comprehensive risk assessment that the particular species poses a low risk of becoming established in the wild in GB. Further advice on the keeping of non-native species in all sectors can be obtained from the Fish Health Inspectorate at Cefas (fhi@cefas.co.uk).

Statistics

2011 Survey of aquaculture production of finfish in the UK

Allan Reese, Cefas

1. Introduction

Data for UK aquaculture production was again collected under EU Regulations 762/2008 and 949/2008 (as explained in *Finfish News* 9, 11 & 13). Within the UK data is collected by regional administrations: Cefas for England and Wales, Marine Scotland Science (MSS) for Scotland, and the Fisheries Division of the Department of Agriculture and Rural Development (DARD) for Northern Ireland. The UK return does not include the Channel Isles or the Isle of Man. The results are collated by Cefas and submitted to Eurostat, FAO and OECD. Data for the EU is requested only at the Member State (MS) level but users within the UK generally need the regional breakdown. Individual farm results are treated as strictly confidential in accordance with the UK Statistics Authority Code of Practice and the results are provided only as statistical summaries.

2. Quality

Data reporting from licensed fish farms again approached 100% and the cooperation of producers and producer organisations is greatly appreciated. No volume measures were estimated and all weights are whole fish (live weight). Typical "farm gate" prices are again based on estimates by experts and the producer organisations, and are considered accurate to at least the first digit. Prices represent fish produced in bulk for the table or restocking; specimen and ornamental fish values are excluded.

In respect of economic data collected under regulation 949/2008, a pilot survey was carried out by Frontline commissioned by Seafish and the MMO to determine the practicalities of conducting an annual economic data collection programme as defined by the data collection framework (DCF) regulations. Frontline were also asked to extrapolate from their survey to make estimates of the 2011 economic values. These were compared with estimates made using the method employed for 2010 based on Office of National Statistics industrial surveys and with estimates based on production volumes. Estimates from the three methods were combined in the national return.

At the time of writing, the finalized report from Frontline has not been discussed but the findings in general supported use of a survey to obtain more direct and better data on the economic status of aquaculture. Such data needs to be sufficiently precise and timely to detect year-on-year changes, and to differentiate between sectors of the industry.

3. Data

General description of the aquaculture sector

The total value of UK aquaculture production in 2011 was £643 million, of which £623 million was finfish, a considerable increase from the 2010 value of £484 million. This reflects both increased volume and a higher price for salmon.

Statistics

2011 Survey of aquaculture production of finfish in the UK

Table 1: UK aquaculture in 2011 (finfish and shellfish)

Finfish	No of Sites	Volume (Tonnes)	Employees (F/T)	Employees (P/T)	Employees (FTE[a])
England	348	11,180	723	318	866
Wales	51	9,137	45	30	59
Scotland	758	170,062	1,438	343	1,592
Northern Ireland	67	8,863	90	30	104
UK total	**1,224**	**199,243**	**2,296**	**721**	**2,620**

Table 1a: The UK finfish aquaculture sector in 2011

Finfish	No of Sites	Volume (Tonnes)	Employees (F/T)	Employees (P/T)	Employees (FTE[a])
England	301	7,311	545	248	657
Wales	40	761	40	26	52
Scotland	423	162,777	1,267	216	1,357
Northern Ireland	26	1,060	41	14	47
UK total	**790**	**171,910**	**1,893**	**504**	**2,113**

[a] *P/T assumed to be 0.45 F/T*

Table 3: Input to aquaculture from wild populations

Reports under this category were only for shellfish harvested in one area and re-laid in another.

Table 2: Harvest for table (i.e. consumption) by species and production method (excluding hatcheries & nurseries). Please note that salmonids stocked into put-and-take fisheries are included, but a small volume of common carp grown for human consumption is excluded.

Production system	Species common name / FAO code	England	Wales	Scotland	Northern Ireland	UK Total	£ per tonne	Imputed farm-gate value
			-------Live weight tonnes------			tonnes		£
Freshwater	Arctic char	11		1.5		12.5	5,500	68,750
	Atlantic salmon	4.5				4.5	26,000	117,000
	Nile tilapia	186				186	3,200	595,200
	Brown trout	393	14	43.3	59	509.3	5,000	2,546,500
	Rainbow trout	6,567	257	3,463	709	10,996	2,200	24,191,200
Seawater	Seabass		490			490	4,500	2,205,000
	Halibut			83.1		83.1	6,000	498,600
	Atlantic salmon			158,013	292	158,305	3,720	588,894,600
	Sea trout			17.5		17.5	2,400	42,000
	Rainbow trout			1,156		1,156	2,600	3,005,600
Total						171,759.9		622,164,450

Statistics

2011 Survey of aquaculture production of finfish in the UK

Table 4a: Production from hatcheries/nurseries of finfish eggs and juveniles (≤80 g). Values are numbers in thousands. Intended use refers to either release into controlled environment (ENVC , i.e. aquaculture) or release for restocking (WILD). Please note that salmonids are reported as intended for a controlled environment even when released into a fishery. The statistics therefore do not seem to include all small-scale conservation activities aimed at boosting local stocks.

Species common name	Intended usea	England		Wales		Scotland		Northern Ireland		UK total	
		Eggs	Juvs	Eggs	Juvs	Eggs	Juvs	Eggs	Juvs	Eggs	Juvs
Atlantic salmon	ENVC	2,920	4,360			64,600	42,700	40		67,560	47,060
Rainbow trout	ENVC	24,940	21,000		2,400	15,100	16,600	33800		73,840	40,000
Brown trout	ENVC	1,600	440	9	3	400	20	700		2,709	463
Barbel	WILD		370								370
Bream	WILD		30								30
Mirror carp	WILD		2,470								2,470
Common carp	WILD		140								140
Crucian carp hybrids	WILD		100								100
Chub	WILD		520								520
Dace	WILD		80								80
Roach	WILD		140								140
Rudd	WILD		40								40
Tench	WILD		130								130
Cod	ENVC					30				30	
Halibut	ENVC					1,600	50			1,600	50

Table 4b: Production of coarse fish >80 g for stocking into angling waters.

Production system	Species common name / FAO code	England	Wales	Scotland	NI	UK Total volume (tonnes)	£ per tonne	Imputed farm-gate value (£)
		-------(Live weight tonnes)------						
Freshwater	Barbel	0.3				0.3	3,000	900
	Common carp, non-ornamental	93				93	13,000	1,209,000
	Mirror carp	45				45	13,000	585,000
	Crucian carp	2.2				2.2	20,000	44,000
	Roach	4.5				4.5	1,250	5,625
	Tench	4.9				4.9	18,000	88,200
Total						149.9		1,932,725

Table 5: Description of aquaculture production units for finfish. Please note that no data is available for volumes of recirculation systems in Scotland.

Environment	Production system	Units	England & Wales	Scotland	Northern Ireland	UK Total
Freshwater	Cages	m^3	10,904	444,000		454,904
	Ponds	Ha	164	5	2	171
	Raceways	Ha	12.4			12.4
	Tanks & raceways	m^3	250,000	69,000	53,220	372,220
	Other (Recirculation)	m^3	944			944
Seawater	Cages	m^3		17,379,000	67,856	17,446,856
	Tanks	m^3		22,000		22,000

Statistics

2011 Survey of aquaculture production of finfish in the UK

Economic return for EC Reg 199/2008

These figures for the macroeconomics of the UK aquaculture industry (finfish and shellfish) are compiled or inferred from various sources as indicated. It would be more accurate, and hence more useful for year-on-year comparisons, if they were compiled from a bottom-up survey within the industry. It would also facilitate regional or sectoral breakdowns. We hope that the pilot survey conducted over the summer 2013 has established that such a survey would be generally acceptable.

Variable	£s	Basis of estimate	Comments
Turnover	£642,569,940	From production survey (volume*value)	Compares to Office of National Statistics Annual Business Survey turnover £560 million
Subsidies	£868,000	Based on pilot survey	Hard to distinguish subsidies for aquaculture from general rural subsidies
Other income	£0	n/a	N/A as turnover based solely on production
Total income	£643,437,940	combination of above items	
Wages and salaries	£53,902,800	combination of above items	Based on % of turnover by species and summed
Imputed value of unpaid labour	£86,800	Survey	Based on pilot survey
Energy costs	£16,578,800	combination of above items	Based on % of turnover
Raw material costs: Livestock costs	£63,971,600	combination of above items	Based on % of turnover
Raw material costs: Feed costs	£269,948,000	combination of above items	Based on % of turnover
Repair and maintenance	£15,016,400	combination of above items	Based on % of turnover
Other operational costs	£98,084,000	combination of above items	Based on % of turnover
Depreciation of capital	£40,796,000	Survey	Based on pilot survey
Financial costs, net	£50,344,000	Survey	Based on pilot survey
Extraordinary costs, net	£217,000	Survey	Based on pilot survey
Total value of assets	£477,400,000	Survey	Based on pilot survey
Net Investments	£30,380,000	Survey	Based on pilot survey
Debt	£144,956,000	Survey	Based on pilot survey
Raw material volume: Livestock	n/a	Survey	Stock can be bought in at variety of weights and usually by number not weight
Raw material volume: Feed	260,000 tonne	Survey	Computed from production volume and FCR
Total sales volume	199,243 tonne	From production survey	Summed production

Statistics

2011 European production of farmed finfish

Tim Ellis, Cefas

In *Finfish News 11*, we published European finfish production data for 2009, downloaded from the Eurostat database. European production data for 2010 and 2011 have only recently become available from this source (http://epp.eurostat.ec.europa.eu/portal/page/portal/fisheries/data/database). To enable comparison with the UK's national production data in the preceding article, 2011 European aquaculture finfish data - values (in Euros) and volumes (tonnes live weight) of production - are summarised in Table 1.

It must be noted that some anomalies were apparent in downloads from the database, e.g.

- No data were available for Poland;
- No economic values were available for Cyprus;
- No salmonid production is recorded for Germany.

In addition, totalled data was missing for some countries that required additional collation. Nevertheless, the data provides a general picture of contemporary European fish farming.

European finfish farmers produced just over 1.9 M tonnes in 2011, with a first sale value of €6.6 billion (Table 1). Norway was by far the largest finfish producer (60% of European production). The UK ranked second among European nations on the basis of value, but third (behind Turkey) on the basis of tonnage.

The Eurostat database categorises finfish production into three sectors, i.e. marine, freshwater and diadromous. Diadromous refers to species that can live in both fresh and marine waters at different stages of the life cycle. Diadromous species formed the bulk (82%) of finfish farmed in Europe, with production focussed on Atlantic salmon and rainbow trout. The marine sector accounted for 14% (focused on gilthead sea-bream and sea-bass). The freshwater sector is the smallest, contributing 3% to total finfish production. If readers are interested in production of particular species, a more detailed breakdown was provided in *Finfish News* 11, and recent information is available from the Eurostat database.

Different nations focus on different sectors of finfish aquaculture. Production is dominated (>80% of national production) by

- Diadromous species in the UK and other northern European countries - Norway, Denmark, Ireland, Finland, Sweden, Iceland, Estonia, Belgium;
- Marine species in southern European countries - Greece, Malta, Portugal, Cyprus;
- Freshwater species in central European countries - Czech Republic, Lithuania, Latvia, Hungary, Romania.

In a few countries, i.e. France, the Netherlands and Croatia, production is more diverse with all three sectors accounting for ≥10% of production tonnage.

Statistics

2011 European production of farmed finfish

Table 1: European production of farmed finfish in 2011. Data by country for value and volume. Sourced from Eurostat database, downloaded on 23/10/13.

Country	Production value	Production volume (live weight)				
		Total	% European production	% national production by category		
	€	tonnes		Diadromous	Marine	Freshwater
Norway	3,711,674,096	1,142,892	59.6%	98.4%	1.6%	0.0%
United Kingdom	717,643,292	171,910	9.0%	99.5%	0.3%	0.2%
Turkey	543,255,683	188,785	9.8%	57.2%	42.7%	0.1%
Greece	446,137,693	89,376	4.7%	2.4%	97.6%	0.1%
Spain	310,600,930	61,527	3.2%	27.7%	72.2%	0.1%
Italy	215,475,125	52,246	2.7%	72.7%	25.8%	1.6%
France	119,637,581	45,422	2.4%	69.2%	13.2%	17.6%
Denmark	95,324,255	31,257	1.6%	100.0%	0.0%	0.0%
Ireland	77,627,322	13,452	0.7%	99.9%	0.0%	0.1%
Malta	50,968,322	4,072	0.2%	0.0%	100.0%	0.0%
Finland	43,105,190	11,275	0.6%	99.3%	0.7%	0.0%
Sweden	41,520,842	11,970	0.6%	100.0%	0.0%	0.0%
Czech Republic	39,865,313	21,010	1.1%	4.0%	0.0%	96.0%
Portugal	29,341,821	5,621	0.3%	19.9%	80.1%	0.0%
Iceland	24,525,375	5,260	0.3%	82.3%	17.7%	0.0%
Netherlands	21,501,950	4,340	0.2%	47.2%	15.4%	37.3%
Bulgaria	16,374,044	6,336	0.3%	42.1%	0.0%	57.9%
Romania	15,888,386	8,352	0.4%	20.7%	0.0%	79.3%
Austria	14,334,277	2,470	0.1%	73.8%	0.0%	26.2%
Croatia	12,139,991	14,039	0.7%	17.7%	55.2%	27.0%
Lithuania	6,885,862	3234	0.2%	1.6%	0.0%	98.4%
Germany	2,739,830	775	0.0%	0.0%	0.0%	100.0%
Slovenia	2,615,071	855	0.0%	71.5%	6.5%	22.0%
Slovakia	2,420,531	913	0.0%	63.3%	0.0%	36.7%
Estonia	1,609,460	418	0.0%	89.0%	0.0%	11.2%
Latvia	1,252,214	545	0.0%	5.5%	0.0%	94.5%
Belgium	155,880	36	0.0%	100.0%	0.0%	0.0%
Hungary	30,293	15,509	0.8%	0.8%	0.0%	99.2%
Cyprus	-	4,660	0.2%	1.4%	98.5%	0.0%
Poland	-	-	-	-	-	-
TOTAL	6,564,650,629	1,918,557	100%			

Statistics

2012 Trade into England and Wales from the EU
Aquatic Trade and Technical Advice Team (ATTA), Cefas

The ATTA team has continued to authorise aquaculture production businesses (APBs) to import and handle EU import notifications using the TRACEs system. This system manages all electronic movement messages between EU countries. In total the ATTA team received 269 finfish intra-community movement notifications in 2012.

The import trade in eyed salmonid ova from within the EU almost doubled in 2012 to 9.7 million, compared to 5.5 million in 2011 (although this is still below the high of 13.6 million ova in 2008). The majority of the 2012 increase is due to the resumption in trade from Northern Ireland and trade from the Isle of Man reverting to historical levels (Table 1). These increases in traditional sources may reflect the cost of importing from third countries, or a general industry trend to return to traditional domestic suppliers.

Trade in VHS and IHN susceptible species, predominantly live turbot for the table, also continues to decline (Table 2). The reasons for this decline are unclear, but probably reflect the economic downturn as turbot are a high value product. There is anecdotal evidence that wild caught turbot are fetching lower prices on the markets.

Trade in SVC susceptible species is continuing its slow decline which probably reflects the recent poor market conditions for coldwater ornamental fish (Table 3). A number of English companies are still maintaining their trade with Eire and Northern Ireland through their approved farm status. More information about meeting requirements to become an approved farm can be obtained from the Fish Health Inspectorate.

The only other significant trade in live aquatic animals is in a variety of species of sturgeon and sterlet. This trade is predominantly for the ornamental trade and 27,000 animals were imported in 2012 from a number of EU countries.

Table 1. Summary of salmonid ova imported into England and Wales by month for 2012. Figures given are 1000s of ova.

2012	Country of Origin				Total
	Northern Ireland	Isle of Man	Denmark	Norway	
January	500	280	0	1.5	781.5
February	850	550	1,025	0	2,425
March	560	550	2,425	0	3,535
April	0	415	775	0	1,190
May	0	75	375	0	450
June	150	0	0	0	150
July	100	0	0	0	100
August	0	0	0	0	390
September	150	0	0	0	150
October	80	0	100	0	180
November	250	0	0	10	260
December	0	153	300	0	453
Total	2,640	2,023	5,000	11.5	9,674.5

Statistics

2012 Trade into England and Wales from the EU

Table 2. Summary of live turbot (VHS and IHN susceptible) imports into England and Wales from the EU by month in 2012. Figures are given as Kgs.

2012	France	Total
January	909	909
February	1,012	1,012
March	925.5	925.5
April	1,125	1,125
May	814	814
June	1,237	1,237
July	715	715
August	1,093	1,093
September	1,108	1,108
October	1,011	1,011
November	906	906
December	616	616
Total	11,471.5	11,471.5

Table 3. Summary of live SVC susceptible imports from the EU into England and Wales by month in 2012. Figures given are 1000s of individual fish.

2012	Goldfish	Total
	Portugal	
January	20	20
February	14	14
March	39	39
April	35	35
May	37	37
June	40	40
July	44	44
August	19	19
September	16	16
October	4	4
November	0	0
December	0	0
Total	268	268

Articles Contents

Articles

Investigation into the occurrence of a chronic inflammatory condition affecting the pectoral fins of cultured rainbow trout

Martyn Jakeman and Steve Feist, Cefas

In recent years, a number of dermal conditions have affected the trout farming industry[1], in particular red mark syndrome (RMS) and puffy skin disease (PSD)[2]. Red mark syndrome has been present in the UK since 2003[2] with PSD causing increased problems since 2011. The causative agent(s) have yet to be conclusively identified for both conditions. Both RMS and PSD have decreased production for many trout farmers because the diseases reduce the aesthetic quality of fish for both sport-angling markets and the table: RMS can lead to higher rejection rates in trout processing plants. Another dermal condition, referred to as "cherry fin", has been reported to affect rainbow trout in the US[3] but no publications describe the condition in detail. Here we provide the first account of "cherry fin" in the UK - its occurrence, a preliminary description of the condition and microscopic features - and outline our ongoing efforts to identify the causative agent.

During a routine visit to a trout farm in England during February 2013, the condition currently referred to as "cherry fin" was reported to the Cefas Fish Health Inspectorate (FHI). The condition was observed to affect rainbow trout (*Oncorhynchus mykiss*), which exhibited red growths restricted to the pectoral fin (Figure 1).

Figure 1. Rainbow trout exhibiting typical cherry fin lesion in the region of the left pectoral fin. Note the erosion of the right pectoral fin.

On the affected farm, cherry fin had first been noted during autumn 2012 in market sized fish (450-550g), in approximately 2–5% of fish in each raceway. Subsequent detailed examination of stocks revealed that the condition was present in all stocks, with the exception of the fry. Close examination of fry revealed reddening and inflammation associated with erosion of the pectoral fin but no signs of the growths seen in older fish. Affected fish did not exhibit changes in behaviour or feeding rates and were not subject to increased mortality. All fish observed with the condition have appeared to be otherwise healthy.

Chloramine-T treatment was used in an attempt to alleviate the condition by reducing bacterial loading on the outside of the fish. Chloramine-T was also used in the fry raceways experiencing the fin erosion. However, the treatment did not appear to benefit the affected fish.

During routine size-grading and harvesting on site in early spring, fish exhibiting the "cherry fin" lesion were removed to a separate raceway for observation as temperatures increased during the following months. No evidence of recovery was seen. Fry which initially showed mild inflammation in the region of the pectoral fin were seen to develop larger lesions. Additionally, new batches of fry brought onto site during summer 2013 showed evidence of incipient growths.

Laboratory analysis

Initial samples were taken by the FHI in February 2013 from a selection of fish exhibiting large lesions and also of fry with fin erosion. At necropsy, no internal pathological signs were seen. The standard suite of virological, bacteriological and histological tests was undertaken at the Cefas Weymouth laboratory.

Isolation attempts for bacterial and viral pathogens were negative.

Histologically, the cherry fin lesions were characterised by a chronic inflammatory response in the dermis and deeper tissues with disorganised, fibrous tissue in the connective tissue, prominent vascularisation, fibrosis and localised haemorrhaging. There was

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Investigation into the occurrence of a chronic inflammatory condition affecting the pectoral fins of cultured rainbow trout

no evidence of pathogen involvement (bacteria, fungi or parasites). There was significant deformity of the pectoral fin with disturbance to the bone formation associated with an extremely vigorous inflammatory reaction and ulceration (Figure 2 A & B). More detailed pathological examination revealed the presence of giant cells, which may suggest the presence of a chronic irritant (pathogen or foreign body/substance). However, at present the possibility that these giant cells are analogous to cells associated with the recycling and formation of scales cannot be ruled out. There is no evidence that the lesions are of neoplastic (tumour) origin. Ultrastructural investigations to elucidate the nature of the cellular response and to check for non-culturable viral agents and other pathogens are underway. Of interest, a single fish exhibiting "cherry fin" also showed evidence of RMS. However, the RMS and "cherry fin" lesions were not contiguous and it remains to be seen whether the two conditions may be related.

Studies are ongoing to determine the pathogenesis of the condition (from fry to market-sized fish) and molecular analysis for cryptic infections with non-culturable agents is planned. Further studies are also required to investigate the potential site level factors which may affect the occurrence of the condition.

At present, "cherry fin" has been reported from two sites. Continued vigilance is required to see whether

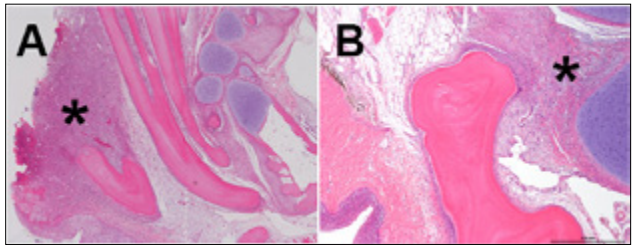

Figure 2: Histological features of sections through "cherry fin" lesions. A. Low power view showing the base of the pectoral fin and associated fin ray with a marked inflammatory response (*); B. Section through bone showing chronic inflammation (*) affecting region between the bone and adjacent cartilage.

the condition persists and/or shows evidence of spread to other locations. Trout farmers observing the condition are encouraged to contact the Cefas Fish Health Inspectorate (T: 01305 206700; E: fhi@cefas.co.uk).

Acknowledgements

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Articles

Emergence of Carp edema virus-like (CEV-like) disease in the UK

Keith Way and David Stone,Cefas

Background

Carp oedema disease was originally described in Japan in the 1970's as a viral oedema of juvenile carp and termed carp edema virus (CEV)[1,2]. The disease agent was shown to be a poxvirus by electron microscopy [3] and also sequence data [4]. Severe disease signs can appear similar to those caused by koi herpesvirus (KHV) disease and include lethargy, enophthalmia (sunken eyes), skin erosion and gill damage. The poxvirus was shown to infect gill epithelial cells and cause severe damage to gill lamellae. The gill tissue damage leads to hypoxia, which causes juvenile carp to become lethargic and congregate near the surface of the pond or near water inlets. More recently the disease has been seen in older carp and termed koi sleepy disease (KSD), because the lethargy manifests as sleepy behaviour, where the affected fish lie on the bottom of the pond and eventually die of anoxia[5]. Losses from KSD/CEV occur in spring and autumn in Japan, over a temperature range of 15 – 25°C, and mortalities can reach 80%. The Japanese manage or prevent outbreaks of KSD by holding the koi in 0.5% salt water following exposure to stressors, such as grading or transportation

CEV-like virus outbreaks in koi and in common carp

At the Cefas laboratory a CEV-like virus was first detected by PCR in imported koi carp, showing signs of KSD, in 2009 and again in 2011. Further detections of CEV-like virus were made from KSD-affected koi in hobbyist ponds in late spring/early summer 2012 and 2013. Low levels of CEV-like virus were also detected in healthy koi imports from Israel and Japan at ornamental fish wholesalers during 2013.

In March 2012 a CEV-like virus was detected for the first time in common carp undergoing mortality and displaying clinical disease, obtained from a cluster of fishery sites in south- east England. Then, in November 2012, a fishery site in the Midlands reported mortalities in common carp showing clinical disease and a CEV-like virus was again detected. Further detections were made in 2013 at two other fishery sites in the Midlands. An important feature of the CEV-like virus in common carp is that the detections were made from disease outbreaks that occurred during periods of low water temperatures (6-9°C) in winter and early spring. Outbreaks of KSD seen in koi ponds have occurred at higher temperatures in late spring/early summer.

Detection of CEV-like virus by PCR

Detection and identification of early cases of KSD was achieved using PCR primers designed by researchers in Japan[3,5]. In some cases however, these primers produced non-specific products of a similar size to the expected product making interpretation of the initial stages of the assay difficult. Therefore, in an attempt to improve reliability of detection a new set of primers was designed based on a large region of putative CEV sequence generated at Cefas. The primer regions targeted are also found in an unpublished CEV sequence[4]. These primers have been shown to produce a clean product in the new assay and are capable of detecting a range of CEV like sequences in koi and common carp.

Gross clinical signs and histopathology

The most consistent behavioural sign is extreme lethargy, where the carp will only attempt to swim when stimulated to do so. Other clinical signs have included ulcerous lesions around the mouth and base of the fins and pale necrotic patches on the gills.

The most severe microscopic changes are seen in the gill tissue and include hypertrophy and severe hyperplasia of branchial epithelial cells and fusion of adjacent secondary lamellae. Oedematous changes are

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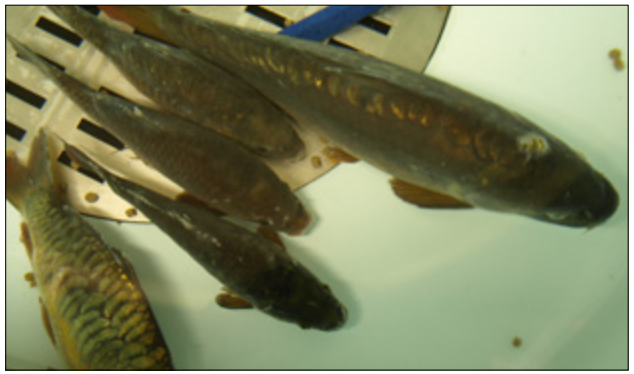

Figure 1: Common carp, held in the Experimental Facility at Cefas, Weymouth, showing CEV-like disease signs of extreme lethargy.

also noticeable at the bases of the secondary gill lamellae. The cellular changes seen in other organs (e.g. in hepatocytes in the liver and in renal epithelial cells) are a result of the hypoxia caused by the severe damage to the gill tissue.

Phylogenetic analysis

The amplification products from the majority of detections, in imported and hobby koi, share 97.5 – 98.4% similarity with the original Japanese CEV and appear to originate from sources connected to Israel. However, CEV-like virus detected in koi at an ornamental fish wholesale site and in a hobbyist's pond in 2013 shared 99.5% nucleotide sequence similarity with the original Japanese CEV. This suggests that the CEV-like virus in these koi originates in, or from a source close to, Japan.

The detections from the fishery carp, from the SE England and Midland sites, shared a 98.2% similarity with each other and only a 93.3 – 95.6 % similarity with the original Japanese CEV and the other CEV-like detections in koi.

Phylogentic analysis revealed two main lineages of CEV-like virus. Lineage 1 contains the samples from imported Israeli and Japanese koi and samples from the hobbyist koi ponds. Lineage 2 consists of the samples from fishery carp from SE England and the Midlands. Within lineage 1, the detections that are more similar to the original Japanese CEV can be distinguished from the other detections from koi. Similarly, in lineage 2 the detections from the Midland sites and the south-east cluster can be distinguished.

Evidence for a CEV-like virus being the cause of the disease outbreaks in common carp

From all outbreaks investigated, the gross clinical signs and disease pathology observed in affected koi and common carp are very similar to KSD reported by Japanese investigators. Furthermore, the strong amplification products obtained after one round of PCR from clinically diseased carp suggests high levels of virus in the gill tissue and the sequence of the products suggests a CEV-like virus. In addition, laboratories in other EU member states (e.g. France, Netherlands) have also detected CEV-like virus in imported koi showing signs of disease. Unfortunately, at Cefas, examination of gill tissue from diseased carp by electron microscopy has not provided conclusive evidence of a poxvirus in the tissues. However, possible immature poxvirus particles

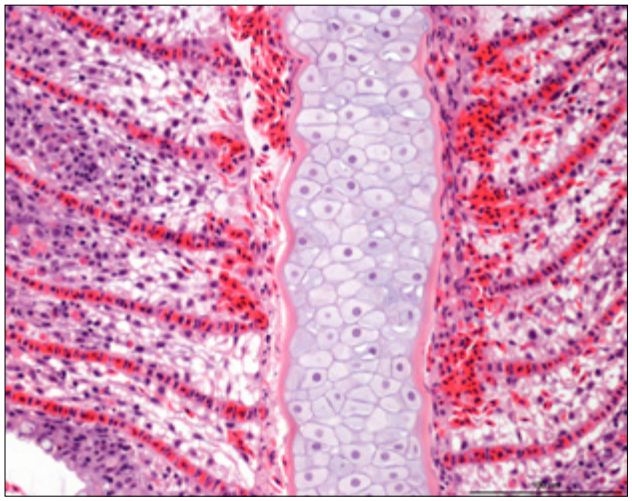

Figure 2: Gill histopathology in common carp showing CEV-like disease signs. H = areas of hyperplasia ; O = Oedematous changes.

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have been seen in one preserved gill sample.

Impact of the disease on common carp populations

Affected fisheries have reported high mortalities of common carp (>50%). The poxvirus causing KSD is non-culturable and, as a result, will not have been readily detected during previous investigations of carp disease outbreaks. As a consequence of this, and of most concern, is that the virus may be more widespread in carp populations than we are currently aware. The range of different CEV-like sequences detected in the common carp and their phylogenetic distance from the original Japanese CEV indicate that the virus may have been introduced into the UK some time ago.

A line of investigation that Cefas is currently exploring, in collaboration with the Environment Agency (EA), is the possibility that the CEV-like agent may be associated with Spring Carp Mortality Syndrome (SCMS). This disease syndrome was first reported in the 1980s and first investigated by the EA and Cefas in the late 1990s. Some cases of spring mortality in carp were shown to be associated with KHV infection, but in the majority of cases the aetiology of SCMS remains unknown.

Further studies

At this stage in the investigation, it is important to confirm the presence of the viral agent of KSD in infected fish tissues. Attempts have been made, at Cefas, to visualise the virus by transmission electron microscopy (TEM) but no recognisable virus particles have been observed.

The Cefas investigations have included attempts at concentration and semi-purification of the virus from gill tissue homogenates. These attempts were successful with regard to concentrating CEV-like DNA but no intact virus particles were visualised by TEM in negative stained samples. There is a possibility that virus levels in affected tissues may have reduced considerably prior to the appearance of clinical disease signs. To improve the likelihood of observing virus particles in the tissues a small study will attempt to transmit the disease agent from infected gill tissue preparations from common carp showing clinical disease to naïve common carp, by bath infection. If the disease seen in adult fishery carp transmits to juvenile carp then examination of sequential tissue samples, during the progression of pathological changes, should provide the evidence needed to confirm the presence of the CEV poxvirus, or other virus, in the fishery carp.

Acknowledgements

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Articles

Outbreaks of Herpesvirus anguillae (HVA) in wild European eels

Chris Williams, Neil Lewin and Amy Reading, Environment Agency

Herpesvirus anguillae (HVA) was first detected in the summer of 2009 following investigations of an eel specific mortality by the Environment Agency's National Fisheries Laboratory, Brampton. This is the first recorded outbreak of HVA in wild eels in the UK[1]. The disease has since been confirmed at three other stillwater fisheries in England following large scale losses of eels. These include two mortality events investigated in the summer of 2013, where losses exceeded those previously recorded. Studies in collaboration with colleagues at Cefas, Weymouth are underway to improve understanding of the distribution and impact of this virus.

Characteristics of mortality

To date, all four outbreaks have occurred in stillwater fisheries in England and involved significant mortality of large eels. It has been estimated from post-event sampling that up to 90% of the eel populations were lost during these events. Mortalities were reported between July and September of each year, with water temperatures between 17° and 21°C. Routine monitoring of water quality, environmental variables and fishery management practices revealed no other obvious cause for the losses. Other fish species present were not affected. Eels examined from the affected sites measured between 520 and 1180 mm and were aged from 17 to 26+ years. It has been proposed that the onset of silvering combined with barriers to escapement may have served as triggers for these outbreaks.

Gross and microscopic changes

Affected eels were very lethargic upon submission to the laboratory and exhibited abnormal mottling of the skin, reddening of the fins, and haemorrhaging in and along the underside of the mouth. Histopathological changes were characterised by necrosis of the gills, skin and liver[1]. In some fish, considerable areas of the gills were necrotic with complete loss of primary lamellae. Secondary fungal infections were also apparent. Marked inflammatory changes were observed, comprising increased numbers of lymphocytes and eosinophillic granular cells. Virus particles were seen in gill epithelial cells.

Disease risk to European eels

As with all new, novel and emerging disease findings, a risk assessment was carried out following the detection of HVA, to assess the threat posed to fisheries, identify knowledge gaps and inform initial management decisions[2]. Outputs of this assessment suggested that HVA posed a significant disease threat. However, this

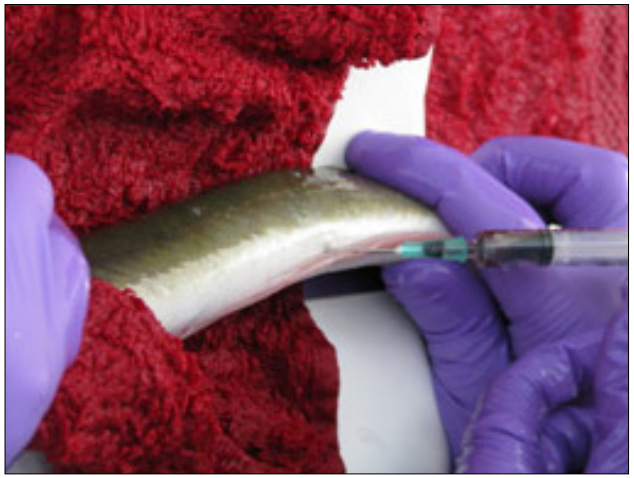

Figure 1. Blood sampling underway to confirm the distribution of HVA and other eel viruses.

was strongly influenced by the perilous state of the European eel stock and generated high uncertainty due to the lack of information about this virus in wild eels. Establishing the distribution of HVA was identified as a priority for further study.

Virus distribution study

HVA is believed to be widespread in Europe and it is feasible that large numbers of eels carry the virus with-

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Outbreaks of Herpesvirus anguillae (HVA) in wild European eels

Figure 2. Gill necrosis combined with fungal infections and loss of filaments as a result of HVA infection.

out developing disease problems. However, no such information exists in the UK. To address this knowledge gap, an eel virus distribution study was set up in 2011 in collaboration with colleagues at Cefas, Weymouth. This non-lethal sampling has involved taking blood from live eels captured during the Environment Agency's routine eel monitoring programme and testing these for antibodies to HVA. Elvers, yellow and silver eels have been sampled from rivers across England and Wales, including primary catchments in each River Basin District. This study is in its third year and will be reported in early 2014. All blood samples have been archived and work is underway to develop the necessary diagnostic tools to detect other important viruses of eels including Eel Virus European X (EVEX).

Health informing future management and recovery of the eel stock

There are many potential causes for the decline of the European eel. Compared with other factors, such as exploitation, passage and habitat loss, health has received little attention, despite growing awareness of its potential role in both the decline of the eel stock and its recovery.

Viral pathogens have the potential to undermine many eel management measures. For example, maximising escapement is a priority for eel management under Council Regulation (EC) 1100/2007, yet viruses like HVA could seriously compromise spawner quality, reducing the fitness and reproductive potential of those fish leaving freshwater[3]. The stocking of elvers to enhance depleted river catchments is also a management priority, yet the spread of viral diseases to otherwise healthy habitats could limit the success of such measures.

It is hoped that the current work will help raise awareness of viral diseases in wild eels, promote reporting of future disease problems and allow better integration of health into future management of this critically endangered species.

For further information on HVA or other fish diseases in the wild please contact: fish.health@environment-agency.gov.uk

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Articles

Angling Trust and Cefas - Crayfish control project

Keith Jeffery and Paul Stebbing, Cefas

The Angling Trust and Cefas have joined forces to find ways of reducing the impact of non-native crayfish on English still-water bodies. The project, funded by Defra and supported by Natural England and the Environment Agency, will run for the next 18 months.

Non-native crayfish are a problem in still-water fisheries because they can feed on fish eggs and fry, other invertebrates (which are food for fish), damage banks by burrowing, and spoil fishing by stealing bait. They can also spread from still-waters to invade other waters and threaten the endangered white-clawed crayfish. This native crayfish is vulnerable to non-native species through predation, competition and a disease (crayfish plague) which is carried by signal crayfish introduced to the UK from America.

The aim of the project is to provide the information required by non-specialists to control crayfish in still-waters. Ultimately, a guide for water managers will be produced that explains the most efficient way to reduce crayfish numbers. Local angling communities will then be enabled to control crayfish themselves, in line with Big Society policy.

Some previous studies have suggested that it is possible to suppress crayfish populations by physically removing individuals. However, there is currently a lack of evidence for the effectiveness of trapping. This research project is focussed on refining trapping protocols and methodology, and has trap design, modelling and field trial aspects.

The **trap design** element is being carried out at the Cefas Weymouth laboratory. Different trap designs will be tested under laboratory conditions to look at:

- The effect of trap design on attraction and retention of different life stages/sizes of crayfish;
- The effect of prior residency, i.e. the first animal to enter the trap, on subsequent attractiveness;
- The most effective trap design for removing various life stages of crayfish.

Mathematical modelling will be used to create a virtual crayfish population. The baseline model of a typical crayfish population (numbers and life stage / size structure) will be validated and improved with information gathered from field trials. Once validated, the model can be used to examine the long-term effects of removal by trapping (or other potential control mechanisms) by simulating the effects on the crayfish population to answer questions such as:

- how much effort is required to eradicate a crayfish population?
- how long will it take?
- which single method works best?
- what are the effects of using a combination of methods?

A good catch of signal crayfish

Trying to answer these questions using traditional field trials would take a very long time; mathematical modelling speeds up the process as well as providing insight into how long-term field trials can be designed.

The **field trials** are being run across six still-water sites that contain enclosed populations of signal crayfish. Volunteers from Angling Trust clubs and the National Trust will trap and record catches using protocols developed by Cefas. Their results will support the computer modelling and laboratory trials at Cefas. The field trials are designed to answer questions such as:

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Angling Trust and Cefas - Crayfish control project

A signal crayfish (note the white patches on the claws, which are characteristic of the species).

Traditional crayfish 'Trappy' traps. These traps were specifically designed for commercial exploitation of populations, with the mesh size allowing the escape of small animals.

- Where should traps be placed within the environment for maximum effectiveness?
- How long do traps need to be left after setting to be most effective?
- What is the most effective time of year to trap the different life stages?
- What is the minimum trapping intensity required to control a crayfish population?
- What are the challenges and opportunities posed by different angling venues (e.g. private, public access and mixed-use waters)?

Cefas will regularly visit each of the sites to update those involved on progress. The impact of the crayfish population on the site will be assessed throughout the study - from a combination of quantitative survey results and qualitative data from questionnaires.

Although trapping is likely to be the basis of any control programme developed, it is unlikely to result in the eradication of a population on its own. Although there does not seem to be a single 'silver bullet' for crayfish control, trapping combined with other methods may yet make eradication possible.

Articles

Between fisheries and bird conservation: the cormorant conflict

A report entitled "Between fisheries and bird conservation: the cormorant conflict" has been published by the European Parliament Directorate-General for Internal Policies. The report, written by Ian Cowx (University of Hull International Fisheries Institute, UK), is available from www.europarl.europa.eu/document/activities/cont/201303/20130308ATT62622/20130308ATT62622EN.pdf. The Executive Summary is reproduced below.

Background

Across Europe, there have been large increases in the numbers of great cormorants over the past decades. Cormorants are now thought to be more frequent and widespread in Europe than at any time in the last 150 years at least. Populations have returned to some areas after a long absence and have also moved into other previously unoccupied areas. The current population trend in Europe is considered as increasing, as well as most national trends of breeding numbers.

The great cormorant is protected under Directive 79/409/EEC (the Birds Directive). Its deliberate capture and killing, disturbance, destruction of its nests or taking of its eggs can only be allowed by Member States if this is done in accordance with the derogation system set out in Article 9 of the Directive. The sinensis subspecies was previously listed in Annex I of the Birds Directive (species for which specific conservation measures were required), but as a consequence of the rapid population growth it was removed from Annex I in 1997.

This increase in numbers and distribution has brought the protected birds into conflict with man. In many European regions, great cormorant populations, in particular of the continental subspecies sinensis, can have potentially serious economic implications by damaging fish stocks and by reducing catches, putting pressure on fishing and aquaculture activities and thus creating various types of socioeconomic conflicts.

On 4 December 2008, echoing concerns from the various sectors affected, the European Parliament adopted a Resolution (P6_TA(2008)0583) towards a European Cormorant Management Plan to minimise the increasing impact of cormorants on fish stocks, fisheries and aquaculture. The Parliament called on the Commission to consider all the legal means at its disposal to reduce the negative effects of the cormorant population on fishing and aquaculture, and to submit a management plan coordinated at European level. However, the European Commission has not considered that an EU-wide management plan would be an appropriate measure to address this issue, arguing that the cormorant problem is of regional scale.

Aim

The aim of this note is:

- to present examples of the cormorant conflict from different EU countries/regions,
- the ways they have been addressed, and the effectiveness of the adopted measures;
- outline the main economic effects of the conflict, and attempt to define the major problems which prevent solving it;
- describe similar conflicts occurring, and the management measures applied;
- discuss the Commission's response to the 2008 Resolution of the EP - to what extent the measures proposed by the Commission support the development of a long-term solution to the cormorant-fisheries conflict?
- recommend a management strategy to reduce the damages caused by cormorants to fisheries and aquaculture.

The note makes use of recent information from publications, academic studies, research projects, websites and databases, European Institutions, authorities of the Members States, and any other relevant sources to review the impact of cormorants on inland fisheries and aquaculture, measures to ameliorate the problems and

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their efficacy and recommendations for management of the fisheries cormorant conflict in Europe.

Key findings

Two pan European censuses conducted by Wetlands International in 2003 (wintering) and 2006 (breeding) estimated a minimum of 372,00 breeding pairs for the whole of the Western Palearctic Region and the presence of at least 520,000 *P. c. sinensis* and *P. c. carbo* overwintering in Europe. Whilst an overall increase in breeding pairs was evident across Europe, different scenarios were found in different regions and countries, such that population numbers are rapidly expanding in some countries, stabilised in other and contracting in a few.

To understand any potential impact requires an understanding of both the overwintering and breeding distributions, and the recognition that cormorants have a highly active dispersal behaviour. Thus when attempting to manage the expansion of cormorant population across Europe, consideration must be given to the dispersal mechanisms of the various populations and particularly the role of juveniles to buffer mortality in existing and new colonies.

The upsurge of fish eating birds, especially cormorants, in inland waters in Europe since the late 1980s has created considerable conflict between conservationists and fisheries managers and practitioners. Damage at fisheries is rarely measured in economic terms rather as potential loss of fish stock based on consumption estimates of known numbers of birds with losses up to 80 kg/ha/yr, decline in catch per unit effort of the fishery, and wounding damage and scarring on individual fish.

Depredation at fish farms can be high and result of aquaculture units becoming economically unviable.

One aspect that is often overlooked is the indirect damage of large numbers of cormorants on ecosystem dynamics. Damage includes destruction of forestry around breeding and overwintering sites, water quality deterioration and significant influx of energy and matter from water to terrestrial ecosystems.

The main measures to control cormorant depredation or reduce numbers are: lethal measures; reducing reproductive success through egg destruction; scaring cormorants; exclusion techniques; habitat modification techniques; and fish stock management techniques. Each measure has restrictions on use and limitations on success. The main conclusion is that no one single management intervention is effective at mitigating the problems created by cormorants.

The feasibility of implementing a wide scale management plan is demonstrated through a example from Lake Huron in North America, but it is questionable whether this strategy is viable in the European scenario because of variation in management emphasis between national jurisdictions.

Several knowledge gaps were identified:

- There is a paucity of studies at different fishery types to help define impact, and there are no precise guidelines or criteria available to assess the scale of alleged damage to fish stocks and fisheries.
- Detailed research into the effectiveness of various measures to reduce the impact of cormorant depredation is needed.
- Few studies have quantified the movements, mortality/survival, immigration and emigration of birds or investigated density-dependent population regulation and carrying-capacity or cormorant populations in different systems.
- There is a need to understand the human dimensions of the conflict, and improve knowledge about how stakeholders respond to various interventions as well as defining collaborative approaches to managing the problems.

Given the complexity of the issues that must be captured if a management plan is to be successful, a multifaceted approach is required that integrates the ecological-social-economic dimensions and addresses

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the limitations of the current knowledge base.

To resolve the problems generated by cormorants moving inland, there is a need to examine the reasons for the colonisation and increased abundance of inland waters. **It is recommended that research efforts focus on understanding the reasons for the range expansion of cormorants across Europe and determining the ecological relationships between cormorant abundance and food resources.**

In order to formulate viable management options and resolve outstanding issues over causality in the cormorant fish conflict, there is an urgent need to assess and quantify the ecological, economic and social damages both at the European level but also damages in the different member states. **It is recommended that a study is carried out as a matter of urgency to quantify the impact of cormorants on inland waters.**

It must be recognised that fisheries and conservation management is today more a multidimensional approach that has to balance human requirements against protection of the environment and biodiversity. Consequently, **strategies to resolve the conflicts between conservation and fisheries protagonists must apply the stakeholder approach to decision-making**. The key to success involves building up relationships and sharing in the decision-making process based on sound science or factual evidence.

The main challenge is linking local, regional, national and European policy processes together in an appropriate coordinated manner. There is a need for a central coordinating unit because of the varying competencies of national and regional management bodies and inconsistencies of management approaches between Member States.

GREAT CORMORANT - APPLYING DEROGATIONS UNDER ARTICLE 9 OF THE BIRDS DIRECTIVE 2009/147/EC

A second report has been published by the European commission. This document aims at clarifying the key concepts under Article 9 of the Birds Directive as they relate to preventing serious damage by cormorants or protecting flora and fauna, and offers practical advice on how to implement these concepts. The guide is intended to be of assistance to authorities as well as other interested parties. It is not legislative in character (not making new rules but providing guidance on the application of those that exist). It is available from http://ec.europa.eu/environment/nature/pdf/guidance_cormorants.pdf

Articles

Protected Food Names

Irene Bocchetta, Food Policy Advisor for Protected Food Names, Defra

It is easy to think that the term "Protected Food Names" is to do with the protection of food in a trademark sense. But for a small team within the Food Policy Unit of Defra, the term has been adopted to mean food and drink products within the UK (not including spirit drinks or wine) which have been designated a **Geographical Indication** such as a Protected Designation of Origin, PDO, Protected Geographical Indication, PGI or a Traditional Speciality Guaranteed, TSG.

The EU Protected Food Names scheme, which is part of the EU Agricultural Product Quality Policy, first came into effect in 1993. It provides fishermen, farmers and other producers with a way in which to add value to their product and enables consumers to identify foods with a clear regional provenance. Its purpose is to strengthen local, regional rural economy by safeguarding food production methods and traditions, as well as protecting the geographical area of food production. Simply, this means that not only is the named product legally protected from any direct or indirect commercial use of the name, or any misuse either of indication or evocation. It also means that the geographical area where that product is made is also protected. Therefore should a food business wish to move their production site from the designated area, they would not be able to take protected name with them.

So far in the UK we have 55 protected food names. These include 14 cheeses, 15 meats and meat products, 5 fruits and vegetables, 3 beers, 3 ciders, 3 perries and 8 fish and seafood products with another 8 fish and seafood products in the pipeline awaiting registration. By the end of this year we could be in the 60s mark.

What do the designations mean?

Products carrying the **Protected Designation of Origin** (PDO) designation are products which have been produced, processed and prepared all within a particular area or region, while exhibiting qualities or characteristics essentially due to that area including natural and human factors. Examples in the fish world would be Karp Zatorski (Poland) and Phú Quóc (Thailand).

Products carrying the **Protected Geographical Indication** (PGI) designation are products that are either produced or processed or prepared within a particular geographical area. There is greater flexibility in the conditions for a PGI as long as the product exhibits specific quality, reputation or other characteristics that are attributable to the geographical region/area. Again examples in the fish world could be ancheng Long Xia (China) and Acciughe sotto sale del Mar Ligure (Italy).

However even though the PDO and PGI differ slightly from each other, they do still require that the product be explicitly connected to the geographical area of production. Be it food manufacturing or fishing, they need to prove how the product carrying the designation is inextricably linked to the geographical area or sea, river or lake, either through savoir faire, tradition, main ingredient or feed.

The Traditional Speciality Guaranteed (TSG) product is not bound by geographical area, and can be designated anywhere in the world, subject to appropriate controls. The TSG requires a product must be traditional, or

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Protected Food Names

established by custom (for at least one generation or 30 years) and have characteristics that distinguish it clearly from other similar food products. "Moules de Bouchot" France is an example of seafood TSG. This means that if mussel harvesters, irrespective of where they are in the world, can fulfil the requirements set out in the technical file of "Moules de Bouchot" and be independently inspected to prove they can harvest mussels using the methods according to that technical file, they too will be able to use the name "Moules de Bouchot" and the TSG logo on their boxes and packaging.

The PDO / PGI product differs from the TSG in that they are bound by geographical region/area. Producers wishing to add themselves to those who already carry a PDO or PGI name would necessarily need to be in the same geographical area of production or harvesting.

Geographical Indications are multi-functional. They are indicators of provenance, origin, tradition and community. They capture local values and artisanal methods, while encouraging environmental stewardship and cultural traditions. They have standards for quality, traceability and food safety; elements of food production consumers are continually more concerned about. All the while Geographical Indications highlight a terroir of a particular region or country and their unique way of producing a food or drink product difficult to produce elsewhere.

Under this system a named food or drink registered at European level will be given legal protection against imitation throughout the EU. Registration can help producers take advantage of the wider markets here and abroad that are arising from consumers' increasing awareness of the importance of regional and speciality foods. Registered products are entitled to carry an EU symbol which can help consumers recognise product as traditional and authentic.

Other benefits of having a protected food name include:

- Proof of authenticity
- Proof of heritage, regionality, place of origin
- Proof of tradition, skill-base, know how
- Proof of speciality, tastes and flavours
- It guarantees the genuine article

This is what we have:	This is what we can look forward to:
Registered UK Fish Geographical Indications • Isle of Man Queenies PDO • Lough Neagh Eels PGI • Traditional Grimsby Smoked Fish TSG • Arbroath Smokies PGI • Whistable Oyster PGI • Cornish Sardines PGI • Scottish Farmed Salmon PGI • Scottish Wild Salmon PG	**UK Fish products yet to be registered:** • Fal Oyster PDO • Selsey Lobster PGI • West Wales Coracle Caught Salmon PDO • West Wales Coracle Caught Sewin PDO • Conwy Mussles PGI • Colchester Oysters PGI • Irish Salmon PGI • London Cure Smoked Scottish Salmon • Welsh Cockles • Welsh Laverbread

Facts and figures

Products carrying these quality marks are increasingly able to use that designation to help them access export markets in both Europe and further afield. It can also make it easier for producers of those products to access EU funding to promote their products abroad and

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to participate in overseas trade missions organized by the Commission. Once protected in the EU this can lead to protection in 3rd countries.

Although the UK has fewer registered products than some other Member States, EU research from 2010 shows that the value of UK PDO/PGI products comes 4th in the EU. Total EU value: 15.8 billion euros; UK contribution: 1.1 billion euros. This figure excludes products protected under the wines and spirits regimes.

Some UK products currently registered under the Protected Food Name scheme include Lough Neagh Eels, Welsh Lamb, Scottish Farmed Salmon, Yorkshire Forced Rhubarb, Isle of Man Queenies, Stornoway Black Pudding, Lakeland Herdwick and Dorset Blue Vinney. Defra officials are working with applications for another 40 UK products which includes applications to protect Selsey Lobster and Fal Oyster. Defra actively encourages more applicants to come forward with products to protect under this scheme. There are many more fish and seafood products which could be eligible to apply, like Devon Crab, Cardigan Bay Prawns and Craster Kippers to name but a few.

For further information contact Ilana.Kosky@defra.gsi.gov.uk or visit www.gov.uk/protected-food-names-guidance-for-producers

Research

1. Consumer image of farmed fish

Increasing fish demand has made aquaculture a necessary complement of fisheries. Consumer acceptance is crucial for market success of aquaculture produce. The present study has investigated the image European consumers have in relation to farmed fish, wild fish, fish as a generic food category and seabass and seabream as the two main cultured species in the European Union (EU). The study aimed to improve current knowledge and bridge geographical gaps with respect to image studies in Europe. In a first exploratory phase, topic-related information was gathered through direct contacts with main stakeholders in different EU countries and through an electronic literature research. In a second phase quantitative descriptive data were collected through cross-sectional consumer surveys in eight EU countries. These were selected to cover the knowledge gaps identified in the exploratory phase, and to cover the different European geographical areas. The country selection was expanded to include the main producer of seabass and seabream, the main importer and some possible target markets. Total sample size was 3,213 respondents. Samples were representative of age and region. European consumers have a very positive image of fish products, especially with respect to its health benefits. Fish origin appeared to be of limited importance; however, wild fish were preferred when compared with farmed fish. Seabass and seabream received positive image scores. Combined with the positive health image of the Mediterranean diet, this could offer marketing opportunities for these fish species.

Vanhonacker F, Verbeke W (2013). European consumer image of farmed fish, wild fish, seabass and seabream. *Aquaculture International* **21, 1017-1033.**

2. Aquaculture certification questioned

Aquaculture, the farming of aquatic organisms, provides close to 50% of the world's supply of seafood, with a value of U.S. $125 billion. It makes up 13% of the world's animal-source protein (excluding eggs and dairy) and employs an estimated 24 million people. With capture (i.e. wild) fisheries production stagnating, aquaculture may help close the forecast global deficit in fish protein by 2020. This so-called "blue revolution" requires addressing a range of environmental and social problems, including water pollution, degradation of ecosystems, and violation of labour standards.

Bush SR, Belton B, Hall D, Vandergeest P, Murray FJ, Ponte S, Oosterveer P, Islam MS, Mol APJ, Hatanaka M, Kruijssen F, Ha TTT, Little DC, Kusumawati R (2013). Certify Sustainable Aquaculture? *Science 341(no. 6150)*, **1067-1068.**

3. Changes in efficiency of Norwegian salmon farming

This article builds on the literature investigating productivity and efficiency in the Norwegian salmon farming industry. The sources of inefficiency can be separated into temporary shocks and factors that lead to permanent efficiency differences. The results indicate an improvement in technical efficiency over time which can partly be explained by a restructuring of the industry, with firms becoming bigger and more specialized, as well as by improvements in government regulations. The inefficiency that is still present is mainly the result of temporary shocks. Disease outbreaks seem to be the most important of these temporary shocks, as disease problems lead to early harvesting or destruction of the fish and thereby increase inefficiency.

Asche F, Roll KH (2013). Determinants of inefficiency in Norwegian salmon aquaculture. *Aquaculture Economics & Management* **17, 300-321.**

4. A new Flavobacterium infection in Spanish farmed trout

A clinical episode of septicemia occurred in a rainbow trout farm located in the central region of Spain. Five strains were isolated from diseased rainbow trout. Cells were Gram-negative rods, 0.7 µm wide and 3 µm long, non-endospore-forming, catalase and oxidase positive. Colonies were circular, yellow-pigmented, smooth and entire on TGE agar after 72 hours incubation at 25°C. They grew in a temperature range between 15°C to 30°C, but they did not grow at 37°C or 42°C. Based on 16S rRNA gene sequence analysis, the isolates belonged to the genus *Flavobacterium*. Several physiological and biochemical tests differentiated the novel bacterial strains from related *Flavobacterium* species. Phylogenetic, genetic and phenotypic data indicate that these strains represent a new species of the genus *Flavobacterium*, for which the name *Flavobacterium plurextorum sp. nov.* was proposed.

Zamora L, Fernández-Garayzábal JF, Sánchez-Porro C, Palacios MA, Moore ER, Domínguez L, Ventosa A, Vela AI (2013).

Research

Flavobacterium plurextorum sp. nov. **isolated from farmed rainbow trout (***Oncorhynchus mykiss***):** *PLoS One* **8.6. e67741.**

5. Weissellosis – an emerging bacterial disease of trout

Recent reports indicate that novel *Weissella sp*. bacteria have been associated with disease outbreaks in cultured rainbow trout at commercial farms in China and Brazil. In the summer of 2011, a severe disease outbreak displaying similar clinical signs occurred at a commercial rainbow trout farm in western North Carolina. Observed signs included dark skin coloration, lethargic swimming, bilateral exophthalmia, corneal opacity, ocular hemorrhage, occasional corneal rupture, and in some cases cerebral hemorrhage. Mortality was most severe in larger fish approaching market size. Bacteria isolated from moribund fish were identified to the genus level as *Weissella sp*. by 16S rRNA gene sequence analysis and were 99% identical to the sequences of isolates collected from the Chinese and Brazilian outbreaks. Laboratory-based disease challenge experiments using the isolated pathogen replicated both the disease signs and induction of mortality in exposed healthy rainbow trout. Aqueous vaccine formulations containing formalin-inactivated whole-cell *Weissella sp*. antigens conferred significant protection against experimental infection when both the vaccine and the pathogen were delivered by injection (87.5 and 85% survival at 38 and 72 days after vaccination, respectively). The *Weissella sp*. vaccine was equally effective when combined with a commercially available *Yersinia ruckeri* vaccine, and this bivalent formulation did not alter the efficacy of the *Y. ruckeri* component. This is the first identification of this emerging rainbow trout disease, which we have termed *Weissellosis*, in the United States, and the spread of this pathogen might pose a significant threat to the domestic rainbow trout aquaculture industry. Our results also suggest that a bivalent *Weissella/Y. ruckeri* vaccine could be used as an effective and economical means for controlling this pathogen.

Welch TJ, Good CM (2013). Mortality associated with Weissellosis (*Weissella sp.***) in USA farmed rainbow trout: potential for control by vaccination.** *Aquaculture* **388-391, 122-127.**

6. Standardising trout skin disease descriptions

Farmed and wild salmonids are affected by a variety of skin conditions, some of which have significant economic and welfare implications. In many cases, the causes are not well understood, and one example is cold water strawberry disease of rainbow trout, also called red mark syndrome, which has been recorded in the UK since 2003. To date, there are no internationally agreed methods for describing these conditions, which has caused confusion for farmers and health professionals, who are often unclear as to whether they are dealing with a new or a previously described condition. This has resulted, inevitably, in delays to both accurate diagnosis and effective treatment regimes. Here, we provide a standardized methodology for the description of skin conditions of rainbow trout of uncertain aetiology. We demonstrate how the approach can be used to develop case definitions, using coldwater strawberry disease as an example.

Oidtmann B, Lapatra SE, Verner-Jeffreys D, Pond M, Peeler EJ, Noguera PA, Bruno DW, St-Hilaire S, Schubiger CB, Snekvik K, Crumlish M, Green DM, Metselaar M, Rodger H, Schmidt-Posthaus H, Galeotti M, Feist SW (2013). Differential characterization of emerging skin diseases of rainbow trout - a standardized approach to capturing disease characteristics and development of case definitions. *Journal of Fish Diseases* **36, 921-937.**

7. Newly discovered virus widespread in wild Norwegian salmon

This is the first comprehensive study on the occurrence and distribution of piscine reovirus (PRV) in Atlantic salmon caught in Norwegian rivers. PRV is a newly discovered reovirus associated with heart and skeletal muscle inflammation (HSMI), a serious and commercially important disease affecting farmed Atlantic salmon in Norway. A cross-sectional survey based on real-time PCR screening of head kidney samples from wild, cultivated and escaped farmed Atlantic salmon caught from 2007 to 2009 in Norwegian rivers has been conducted. In addition sea-trout and Arctic char were tested. PRV was detected in Atlantic salmon from all counties included in the study and in 31 of 36 examined rivers. PRV was also detected in sea-trout but not in Arctic char. The proportion of PRV positives was 13.4% in wild Atlantic salmon, 24.0% in salmon released for stock enhancement purposes and 55.2% in escaped farmed salmon. Histopathological examination of

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hearts from 21 PRV-positive wild and one cultivated salmon revealed no HSMI-related lesions. Thus, it seems that PRV is widespread in Atlantic salmon returning to Norwegian rivers, and that the virus can be present in high titres without causing lesions traditionally associated with HSMI.

Garseth ÅH, Fritsvold C, Opheim M, Skjerve E, Biering E (2013). Piscine reovirus (PRV) in wild Atlantic salmon, *Salmo salar* **L., and sea-trout,** *Salmo trutta* **L., in Norway.** *Journal of Fish Diseases* **36, 483-493.**

8. New gill disorder in Scottish salmon

Gill disorders have emerged in recent years as a significant problem in the production of marine-stage Atlantic salmon. The multi-aetiological condition 'proliferative gill inflammation' (PGI) has been reported to cause heavy losses in western Norway, yet reports of Scottish cases of the disease have remained anecdotal. In the present study, histopathological material from a marine production site in the Scottish Highlands experiencing mortalities due to a seasonal gill disease with proliferative-type pathology was examined using light microscopy, special staining techniques and transmission electron microscopy (TEM). The microsporidian *Desmozoon lepeophtherii* (syn. *Paranucleospora theridion*) was identified by staining using a Gram Twort method and TEM associated with distinctive proliferative and necrotic pathology confined to the interlamellar Malpighian cell areas of the primary filaments. Epitheliocystis was not a feature of the gill pathology observed. It is believed this is the first report of *D. lepeophtherii* being identified associated with pathology in a Scottish gill disease case, and supports anecdotal reports that a disease at least partly synonymous with PGI as described by Norwegian researchers is present in Scottish aquaculture.

Matthews CGG, Richards RH, Shinn AP, Cox DI (2013). Gill pathology in Scottish farmed Atlantic salmon, *Salmo salar* **L., associated with the microsporidian** *Desmozoon lepeophtherii* **Freeman et Sommerville, 2009.** *Journal of Fish Diseases* **36, 861-869.**

9. Cyprinids and non-cyprinids are KHV carriers

The koi herpesvirus (KHV) has spread worldwide since its discovery in 1998 and causes disease and mortality in koi and common carp populations with a high impact on the carp production industry. Many investigations have been conducted to examine ways of distribution and to identify possible transmission vectors. The answers, however, raise many new questions. In the present study, different wild fish species taken from carp ponds with a history of KHV infection were examined for their susceptibility to the virus. In the tissue of these fish, the virus load was determined and it was tested whether a release of the virus could be induced by stress and the virus then could be transferred to naive carp. Wild fish were gathered from carp ponds during acute outbreaks of virus-induced mortality in summer and from ponds stocked with carp carrying a latent KHV infection. From these ponds, wild fish were collected during the harvesting process in autumn or spring when the ponds were drained. We found that regardless of season, temperature variation, age and infection status of the carp stock, wild fish from carp ponds and its outlets could be tested positive for the KHV genome using real-time PCR with a low prevalence and virus load. Furthermore, virus transfer to naive carp was observed after a period of cohabitation. Cyprinid and non-cyprinid wild fish can therefore be considered as an epidemiological risk for pond carp farms.

Fabian M, Baumer A, Steinhagen D (2013). Do wild fish species contribute to the transmission of koi herpesvirus to carp in hatchery ponds? *Journal of Fish Diseases* **36, 505-514.**

10. KHV shedding induced by disturbance

Cyprinid herpesvirus-3 (CyHV-3, koi herpesvirus, KHV) is the causative agent of an economically important disease in carp. The mode of transmission of this virus, especially how the infectious agent is introduced into ponds de novo, is not known in detail. The aim of this study was to investigate the shedding of CyHV-3 from fish with latent infections, under aquaculture conditions. Ponds in Saxony, Germany, with latently infected carp were examined at different times during the production cycle to investigate the influence of fish farming procedures on virus activation and shedding. Some of the latently infected carp shed CyHV-3. Virus shedding was induced mainly when the ponds were drained and the carp either harvested or moved to different ponds, and was independent of the water temperature. This indicated that during these times there was a risk that effluent water from the ponds could disseminate the infectious agent. During summer, on-growing carp are infected with low numbers of CyHV-3. These findings

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are important for disease management strategies in carp aquaculture and for the design of testing protocols for the detection of latent infection in carp populations.

Baumer A, Fabian M, Wilkens MR, Steinhagen D, Runge M (2013). Epidemiology of cyprinid herpesvirus-3 infection in latently infected carp from aquaculture. *Diseases of Aquatic Organisms* **105, 101-108.**

11. Sea lice reviewed

Salmon lice, *Lepeophtheirus salmonis*, are naturally occurring parasites of salmon in sea water. Intensive salmon farming provides better conditions for parasite growth and transmission compared with natural conditions, creating problems for both the salmon farming industry and, under certain conditions, wild salmonids. Salmon lice originating from farms negatively impact wild stocks of salmonids, although the extent of the impact is a matter of debate. Estimates from Ireland and Norway indicate an odds ratio of 1.1:1-1.2:1 for sea lice treated Atlantic salmon smolt to survive sea migration compared to untreated smolts. This is considered to have a moderate population regulatory effect. The development of resistance against drugs most commonly used to treat salmon lice is a serious concern for both wild and farmed fish. Several large initiatives have been taken to encourage the development of new strategies, such as vaccines and novel drugs, for the treatment or removal of salmon lice from farmed fish. The newly sequenced salmon louse genome will be an important tool in this work. The use of cleaner fish has emerged as a robust method for controlling salmon lice, and aquaculture production of wrasse is important towards this aim. Salmon lice have large economic consequences for the salmon industry, both as direct costs for the prevention and treatment, but also indirectly through negative public opinion.

Torrissen O, Jones S, Asche F, Guttormsen A, Skilbrei O, Nilsen TF, Horsberg TE, Jackson D (2013). Salmon lice - impact on wild salmonids and salmon aquaculture. *Journal of Fish Diseases* **36, 171-194.**

12. Using wrasse to remove lice

The ectoparasitic salmon louse (*Lepeophtheirus salmonis*) is a serious problem in Atlantic salmon and rainbow trout aquaculture. These parasitic copepods attach to fish and feed on their mucus and tissue, reducing feed conversion efficiency and causing sores, thereby increasing farming costs and reducing the value of the product. Many non-pharmaceutical approaches to controlling sea lice are being developed. One such is to use cleaner fish (in this case, wrasse) in co-culture with salmon to remove salmon lice. The objectives of this study were to assess the efficiency of wrasse as delousing agents and to compare the relative efficiency of wild vs. cultured individuals. Wrasse were extremely efficient in delousing salmon. At a ratio of 5% wrasse to salmon, the mean number of mobile life history stages of lice on salmon was maintained at a level of less than one per fish. Intensively cultured wrasse were as efficient as wild wrasse at removing lice. The presence of wrasse did not affect the growth of salmon. This study demonstrates that wrasse, including intensively cultured ballan wrasse naive of either salmon or salmon lice, can be introduced into sea cages on salmon farms and keep salmon lice loads at very low levels.

Skiftesvik AB, Bjelland RM, Durif CMF, Johansen IS, Browman HI (2013). Delousing of Atlantic salmon (*Salmo salar***) by cultured vs. wild ballan wrasse (***Labrus bergylta***).** *Aquaculture* **402-403, 113-118.**

13. Wrasse susceptible to AGD

Ballan wrasse is cultured for the use as cleaner fish in Atlantic salmon farms. A low level of mortality was experienced in ballan wrasse broodstock tanks during spawning. Examined moribund and clinically healthy fish showed patchy gill lesions characteristic of amoebic gill disease (AGD). Microscopy on wet preparations from gill patches showed large numbers of amoebae. Histology revealed pathology characteristic for AGD, such as extensive hyperplasia, bridging of lamellae and forming of interlamellar spaces. Lesions were associated with amoebae, resembling *Paramoeba* spp. Molecular studies on both gill samples and gill-derived amoeba-cultures showed the presence of *Paramoeba perurans*. These observations show that cultured ballan wrasse may host *P. perurans* infections. Since this observation suggests that ballan wrasse may be infected with *P. perurans* also in nature, the possible role of wrasses in the epizootiology of AGD in salmonid aquaculture needs to be examined.

Karlsbakk E, Olsen AB, Einen A-CB, Mo TA, Fiksdal IU, Aase H, Kalgraff C, Skår S-Å, Hansen H (2013). Amoebic gill disease due to *Paramoeba perurans* **in ballan wrasse (***Labrus bergylta***).** *Aquaculture* **412-413, 41-44.**

14. FAO report on aquaculture's use of veterinary medicines

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As a food producing sector, aquaculture is extremely important but it is also complex because of the difficulty in restricting contact with the natural environment. Managing aquatic animal health and good biosecurity governance are key features which need to be given priority attention. Prudent use of aquaculture drugs offers many opportunities to improve the sustainability of the aquaculture sector in terms of better biosecurity policy, enhancement of diagnostic services, active promotion of responsible production practices, more attention to human and animal health and protection of the environment. For aquaculture producers, responsible use of veterinary medicines could be a good incentive to: (1) improve fish health, food safety and subsequent public health, and (2) reduce environmental impacts and increase their income and profit. It helps produce resilient stocks and make them resilient producers.

Anon (2013). Aquaculture initiatives on prudent and responsible use of veterinary medicines. *FAO Aquaculture Newsletter* **51, 29-31.**

15. Phage therapy for salmonid vibriosis

Vibrio anguillarum is a marine bacterium that can cause vibriosis in several fish species of economic importance. The use of bacteriophage is an alternative strategy to control vibriosis in aquaculture systems. Here, we present the isolation and characterization of six phages that are able to infect the pathogenic strain of *V. anguillarum*, PF4. These phages all possess a similar double stranded DNA genome but, according to their restriction pattern, can be differentiated into three types. The phages exhibited a similar host range, infecting both *V. anguillarum* and *V. ordalii* but not *V. parahaemolyticus* strains. The CHOED phage protected salmon against experimentally induced vibriosis with the strain PF4. The presence of the phage increased the survival of fish to 100% when it was used with a MOI of 1 and 20, versus less than 10% of survival in the absence of the phage. To our knowledge, this is the first report of the ability of *V. anguillarum* phages to protect fish against experimental infection with *V. anguillarum*, and our results support the development of phage therapy as a valid alternative for the control of vibriosis in salmonid aquaculture.

Higuera G, Bastías R, Tsertsvadze G, Romero J, Espejo RT (2013). Recently discovered *Vibrio anguillarum* **phages can protect against experimentally induced vibriosis in Atlantic salmon,** *Salmo salar*. *Aquaculture* **392-395, 128-133.**

16. Factors affecting mortality of farmed salmon

Databases of site production have an important role to play in the investigation and understanding of diseases, since they store valuable amounts of disease and management data. Diseases pose an important constraint to economic expansion of aquaculture. They are dependent on the complex interacting factors of pathogen, environment, and host, and the causes of death can be related to nutritional, environmental, and genetic factors of the host or infectious agents. We examined the drivers of mortality from a single site-production database, which represented one-third of Scottish farmed salmon production in 2005, to determine whether mortality 'benchmarking' data could be generalised across sites and production cycles. We show that farm mortality records play an important role in studying mortality losses and identify management problems in production. Mortalities varied across the months of the year and with the time of year of initial stocking. Production cycles that started in the third quarter of the year had the highest mortality overall. Furthermore, we found site-to-site variation in mortality that may have been caused by either random occurrence of epidemics and environmental events or other local effects.

Soares S, Murray AG, Crumlish M, Turnbull JF, Green DM (2013). Factors affecting variation in mortality of marine Atlantic salmon *Salmo salar* **in Scotland.** *Diseases of Aquatic Organisms* **103, 101-109.**

17. Formal and standardized assessment of fish welfare

A semantic model for overall welfare assessment of Atlantic salmon reared in sea cages is presented. The model, called SWIM 1.0, is designed to enable fish farmers to make a formal and standardized assessment of fish welfare using a set of selected welfare indicators. In order to cover all welfare relevant aspects from the animals' point of view and to create a science-based tool we first identified the known welfare needs of Atlantic salmon in sea cages and searched the literature for feasible welfare indicators. The framework of semantic modelling was used to perform a structured literature review and an evaluation of each indicator. The selected indicators were water temperature, salinity, oxygen saturation, water current, stocking density, lighting, disturbance, daily mortality rate, appetite, sea

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lice infestation ratio, condition factor, emaciation state, vertebral deformation, maturation stage, smoltification state, fin condition and skin condition. Selection criteria for the indicators were that they should be practical and measureable on the farm, that each indicator could be divided into levels from good to poor welfare backed up by relevant scientific literature. To estimate each indicator's relative impact on welfare, all the indicators were weighted based on their respective literature reviews and according to weighting factors defined as part of the semantic modelling framework. This was ultimately amalgamated into an overall model that calculates welfare indices for salmon in sea cages. More importantly, the model identifies how each indicator contributes (negatively and positively) to the overall index and hence which welfare needs are compromised or fulfilled.

Stien LH, Bracke MBM, Folkedal O, Nilsson J, Oppedal F, Torgersen T, Kittilsen S, Midtlyng PJ, Vindas MA, Øverli Ø, Kristiansen TS (2013). Salmon Welfare Index Model (SWIM 1.0): a semantic model for overall welfare assessment of caged Atlantic salmon: review of the selected welfare indicators and model presentation. *Reviews in Aquaculture* **5, 33-57.**

18. Fasting and trout welfare

Fasting fish before slaughter is a common practice in aquaculture but it is not clear how long rainbow trout can be starved before suffering unnecessary stress, nor at what moment of the day slaughter is least stressful. We fasted 90 rainbow trout for 24, 48 and 72 h (19.5, 38.8 and 58.0 °C days) and slaughtered them in the morning (08:00), afternoon (14:00) and night (20:00) to observe the effect of fasting duration and slaughter time on physiological welfare indicators (plasma cortisol, glucose and lactate; hematocrit; leucocyte count). The values of the fasted fish were compared with 90 control fish kept under similar conditions but not fasted. Body weight was not significantly different between fasted fish and controls during the trial but the relative weight of the gut was higher in control trout. Cortisol levels were similar between fasted and control fish and among the treatment groups. Similar results were found for glucose and lactate concentrations in plasma. Hematocrit values were also normal and similar between fasted fish and controls throughout the experiment, but leucocyte count was slightly lower in fasted fish by day three. There were no clear differences in any of the stress parameters in the morning, afternoon and night in either treatment. These results suggest that rainbow trout can cope with fasting up to three days (58 °C days) prior to slaughter and that their welfare is therefore not seriously compromised.

López-Luna, J, Vásquez L, Torrent F, Villarroel M (2013). Short-term fasting and welfare prior to slaughter in rainbow trout, *Oncorhynchus mykiss*. *Aquaculture* **400-401, 142-147.**

19. Carbon monoxide stunning of salmon

Stunning methods for Atlantic salmon can still be improved with regard to animal welfare. Salmon exposed to carbon monoxide (CO) expressed no aversive reactions. CO exposed fish showed an earlier onset of rigour mortis and a faster decrease in muscle pH due to depletion of oxygen during the treatment. Exposure to CO did increase the level of cortisol compared to undisturbed control fish, but the increase was less than in the water only control group. Neuroglobin, a CO binding globin, was found in salmon brain and saccus vasculosus, a richly vascularized sac connected to the fish brain. Binding of CO to neuroglobin during sedation might possibly improve animal welfare.

Bjørlykke GA, Kvamme BO, Raae AJ, Roth B, Slinde Erik (2013). Slaughter of Atlantic salmon (*Salmo salar* **L.) in the presence of carbon monoxide.** *Fish Physiology and Biochemistry* **39, 871-879.**

20. Fin erosion and injuries reduce survival after release

The implications of fin erosion and other injuries that are directly or indirectly caused by the hatchery environment have long been debated. Fin condition has been regarded as an indicator of welfare in fish farms, but until now there has been little evidence that eroded fins have negative effects on survival after stocking in the wild. Based on over 40 years of tagging and recapture data, we show that Atlantic salmon with dorsal fin erosion and brown trout with any kind of injuries had lower recapture rates than fish without injuries. In salmon, precocious mature males had a lower probability of being recaptured compared with immature fish. Data from a hatchery monitoring program indicated that the degree of fin erosion on the dorsal fin in salmon and on the caudal fin in trout was correlated with the number of other injuries. We conclude that fin erosion and other injuries may reduce the probability of survival after release. All actions in the hatcheries

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to reduce fin erosion and other injuries will most likely be positive for the long-term outcome of the stocking programs.

Petersson E, Karlsson L, Ragnarsson B, Bryntesson M, Berglund A, Stridsman S, Jonsson S (2013). Fin erosion and injuries in relation to adult recapture rates in cultured smolts of Atlantic salmon and brown trout. *Canadian Journal of Fisheries and Aquatic Sciences* **70, 915-921.**

21. Environmental enrichment does affect salmon

Stocking programs using hatchery-reared salmon are often implemented for augmenting natural populations. However, survival of these fish is often low compared with wild conspecifics, possibly because of genetic, physiological, and behavioural deficiencies. Here, we compared presmolt Atlantic salmon from three different environmental treatments (barren environment, plastic tube enrichment, and plastic shredding enrichment) with regard to plasma cortisol levels, shelter-seeking behaviour, and fin deterioration. Basal plasma cortisol levels were higher in barren-reared fish, indicating higher stress levels, while no differences were found in acute cortisol response after a 30 min confinement test. Shelter-seeking was higher in salmon reared in enriched tanks when tested alone, but not when tested in small groups. Barren-reared fish had higher levels of fin deterioration over winter, potentially owing to higher aggression levels. These results suggest that enrichment can reduce the impact of stressors experienced in the hatchery and thus increase fish welfare. Tank enrichment may also be used to produce salmon better adapted for the more complex environment encountered after release.

Näslund J, Rosengren M, Del Villar D, Gansel L, Norrgård JR, Perssom L, Winkowski JJ, Kvingedalg E (2013). Hatchery tank enrichment affects cortisol levels and shelter-seeking in Atlantic salmon (*Salmo salar***).** *Canadian Journal of Fisheries and Aquatic Sciences* **70, 585-590.**

22. Stimuli to herd fish

Understanding species-specific flight behaviours is essential in developing methods of guiding fish spatially, and requires knowledge on how groups of fish respond to aversive stimuli. By harnessing their natural behaviours, the use of physical manipulation or other potentially harmful procedures can be minimised. We examined the reactions of sea-caged groups of 50 salmon to short-term exposure to visual or acoustic stimuli. In light experiments, fish were exposed to one of three intensities of blue LED light (high, medium and low) or no light (control). Sound experiments included exposure to infrasound (12 Hz), a surface disturbance event, the combination of infrasound and surface disturbance, or no stimuli. Groups that experienced light, infrasound, and the combination of infrasound and surface disturbance treatments, elicited a marked change in vertical distribution, where fish dived to the bottom of the sea-cage for the duration of the stimulus. Light treatments, but not sound, also reduced the total echo-signal strength (indicative of swim bladder volume) after exposure to light, compared to pre-stimulus levels. Groups in infrasound and combination treatments showed increased swimming activity during stimulus application, with swimming speeds tripled compared to that of controls. In all light and sound treatments, fish returned to their pre-stimulus swimming depths and speeds once exposure had ceased. This work establishes consistent, short-term avoidance responses to these stimuli, and provides a basis for methods to guide fish for aquaculture applications, or create avoidance barriers for conservation purposes. In doing so, we can achieve the manipulation of group position with minimal welfare impacts, to create more sustainable practices.

Bui S, Oppedal F, Korsøen ØJ, Sonny D, Dempster T (2013). Group behavioural responses of Atlantic salmon (*Salmo salar* **L.) to light, infrasound and sound stimuli.** *PLoS One* **8.5. e63696**

23. How good are farmers' estimates of their stocks?

Accuracy and precision of number, mean weight and biomass estimation at time of harvest of farmed Atlantic salmon were investigated using harvest-time data from 240 pens belonging to three large salmon producers in mid-Norway. The results show high accuracy and poor precision of estimates where, at the pen level, mean errors are close to zero, but approximately 50% of estimates fall outside 3% errors and approximately 10% remain outside ± 10% of the true values. The mean absolute biomass estimation error on pen level was 5.1%. Errors were reduced when figures were aggregated at the site and company level due to opposite directed errors cancelling each other. The symmetric distribution around zero suggests that the poor precision is an

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effect of random errors. Mortality above median was found to be statistically associated with underestimation of the fish numbers for harvest. Error in number estimation was found to be inversely associated with errors in mean weight estimation. Norwegian salmon production is regulated by maximum allowed biomass per license where random errors in stock estimation may contribute to overstocking and subsequent regulatory actions. The poor precision in stock estimation is currently an obstacle to further development and profitability in the industry. Correcting the factors identified in this study may give minor improvements in stock estimation while major improvements will require new methods and/or equipment.

Aunsmo A, Skjerve E, Midtlyng PJ (2013). Accuracy and precision of harvest stock estimation in Atlantic salmon farming. *Aquaculture* **396-399, 113-118.**

24. Optimising triploidy induction in brown trout

Inland fisheries contribute substantially to the economies of England and Wales. Many trout fisheries rely partly or entirely on stocking to maintain catches. Given that farmed trout often differ genetically from their wild counterparts, wild trout could be at risk of reduced fitness due to interbreeding or competition with farmed fish. As a preventative measure, the UK Environment Agency has implemented the "National Trout and Grayling Strategy" which will only give consent to the stocking of rivers and some still-waters with sterile, all-female triploid brown trout. In order to produce an optimised hydrostatic pressure induction protocol three experiments were conducted to (1) determine the optimal timing of application post-fertilisation, (2) define optimal pressure intensity and duration of the shock and (3) study the effect of temperature (6-12 °C) on triploid yield. Triploid rate was assessed using two different ploidy verification methods (blood smear and flow cytometry). Results indicated high survival to yolk sac absorption stage (69.2-93.6%) and high triploid yields (82.5-100%) from the range of treatments applied. Furthermore, no significant differences in triploid rates were shown when shock timings and durations were adjusted according to the temperature used. In all treatments deformity prevalence remained low (< 1.8%) during incubation up to yolk sac absorption (550 degree days post hatch). Overall, this study showed that the optimised pressure shock for the induction of triploidy in brown trout delivering high survival and 100% triploid rate (a prerequisite to brown trout restocking) is a shock with a magnitude of 10,000 psi applied at 300 centigrade temperature minutes (CTM) for at least 5 min duration. The study also validated blood smear and flow cytometry as simple and accurate ploidy assessment techniques for brown trout.

Preston AC, Taylor JF, Craig B, Bozzolla P, Penman DJ, Migaud H (2013). Optimisation of triploidy induction in brown trout (*Salmo trutta* **L.).** *Aquaculture* **414-415, 160-166.**

25. Red light stimulates tilapia to feed

Nile tilapia fish were individually reared under similar light levels for 8 weeks under five different light spectra: white, blue, green, yellow or red. The effects of light on feeding, latency to begin feeding, growth and feed conversion were measured during the last 4 weeks of the study (i.e., after acclimation). We found that red light stimulates feeding, as in humans, most likely by affecting central control centers, but the extra feeding is not converted into growth.

Volpato GL, Bovi TS, de Freitas RHA, da Silva DF, Delicio HC, Giaquinto PC, Baretto RE (2013). Red light stimulates feeding motivation in fish but does not improve growth. *PLoS ONE* **8(3): e59134.**

26. Using artificial light to control swimming depth in salmon sea-cages

Submerged artificial light sources are commonly used to control sexual maturation in farmed Atlantic salmon, but may also be a tool to steer salmon to swim at depths which are optimal for production. In this study, we used an individual-based model of the behaviour of salmon toward environmental variability to simulate the swimming depths of salmon in different seasons, production environments and artificial light regimes. Model outputs agreed with direct observations of salmon swimming depths from literature, suggesting that the model accurately simulated the behavioural mechanisms behind responses toward artificial lights superimposed upon different environmental conditions. We used the model in a series of in-silico experiments to predict the behavioural effects of submerged artificial lights placed at different depths in environmental conditions typical for coastal waters in winter, spring and summer. The model indicated that artificial lights

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controlled salmon swimming depths most efficiently in winter. Further, lights may be more efficient in sites with a more homogeneous environment throughout the water column (e.g. open coast) than sites that are thermally stratified (e.g. fjords). Placing submerged lights at the right depths could produce better culture conditions, ultimately resulting in increased growth. With standard measurements of temperature at several depths as a sole user input, the model could act as a tool to inform farmers of which depths to place their lights on any given day or season.

Føre M, Dempster T, Alfredsen JA, Oppedal F (2013). Modelling of Atlantic salmon (*Salmo salar* L.) behaviour in sea-cages: Using artificial light to control swimming depth. *Aquaculture* **388-391, 137-146.**

27. Low light intensity reduces smolt quality

This study investigated the effects of light intensity (10, 21, 43, 200 and 650 lx) during smolting on gill Na^+,K^+-ATPase (NKA) activity, endocrinology, ion regulation, growth, morphology, and spinal development in Atlantic salmon. NKA activity, plasma glucose and blood PCO_2 were all affected by time (study duration 176 days), while no differences were seen as a result of the different light intensity treatments. Growth rate was positively correlated to light intensity. Lower body silvering index, reduced fin area (5-7% lower in the 10 and 21 lux groups) and increased percentage of skeletal abnormalities (6.9% in the 10 lux group vs. 1% in the 650 lux group) were seen at low light intensity. In a second experiment salmon parr were reared in August at LD 12:12, at either 1 lx or 1000 lx and circulating plasma thyroxin (FT) levels were measured. Plasma FT4 levels remained low in the low light intensity group (1 lx), whereas FT4 levels increased significantly from 2 to 5 h in the high intensity group (1000 lx). Total T4 levels were nearly 2-fold higher 5 h after lights-on in the high intensity group compared with the low. Overall, the present data suggests that a minimum light intensity of 43 lx is needed to secure optimal smolt quality, development, welfare and growth in Atlantic salmon.

Handeland SO, Imsland AK, LOE, Nilsen TO, Hosfeldd CD, Baeverfjord G, Espmark Å, Rosten T, Skilbrei OT, Hansen T, Gunnarsson GS, Brecki O, Stefansson SO (2013). Low light intensity can reduce Atlantic salmon smolt quality. *Aquaculture* **384-387, 19-24.**

28. Reared trout show lateral line abnormalities

Despite identification of multiple factors mediating salmon survival, significant disparities in survival-to-adulthood among hatchery- versus wild-origin juveniles persist. In the present report, we explore the hypothesis that hatchery-reared juveniles might exhibit morphological defects in vulnerable mechanosensory systems prior to release from the hatchery, potentiating reduced survival after release. Juvenile steelhead from two different hatcheries were compared to wild-origin juveniles on several morphological traits including lateral line structure, otolith composition (a proxy for auditory function), and brain weight. Wild juveniles were found to possess significantly more superficial lateral line neuromasts than hatchery-reared juveniles, although the number of hair cells within individual neuromasts was not significantly different across groups. Wild juveniles were also found to possess primarily normal, aragonite-containing otoliths, while hatchery-reared juveniles possessed a high proportion of crystallized (vaterite) otoliths. Finally, wild juveniles were found to have significantly larger brains than hatchery-reared juveniles. These differences together predict reduced sensitivity to biologically important hydrodynamic and acoustic signals from natural biotic (predator, prey, conspecific) and abiotic (turbulent flow, current) sources among hatchery-reared steelhead, in turn predicting reduced survival fitness after release. Physiological and behavioral studies are required to establish the functional significance of these morphological differences.

Brown AD, Sisneros JA, Jurasin T, Nguyen C, Coffin AB (2013). Differences in lateral line morphology between hatchery- and wild-origin steelhead. *PLoS One* **8.3 e59162**

29. Farmed sea-bass and sea-bream show lateral line abnormalities

The lateral line of aquaculture fishes has rarely been studied although it is a very important anatomical organ that could serve as an inexpensive and easy tool to distinguish farmed from wild individuals. In the present study, lateral line deformities were examined in both wild and farmed sea-bass and sea-bream specimens to try to detail all possible differences between them. In order to do so, the morphology of the trunk lateral line in wild and farmed adults was examined whereby two major deformities were observed in both species: the 'scale pocket' deformity (14-40% incidence in all

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groups) where the specialized scales are missing but the canal underneath is present and the scale print is obvious, and the 'somatic scales' deformity (14-56% incidence in farmed individuals only) where the missing lateral line is covered with normal somatic scales. Histological examination confirmed the macroscopic observations in that the lateral line mechanism was present - although damaged - beneath the scale pocket deformity and completely absent beneath the somatic scales deformity. It is argued that the scale pocket deformity is a result of an accident during the life of the fish whereas the somatic scales deformity is an actual deformity in development.

Sfakianakis DG, Katharios P, Tsirigotakis N, Doxa CK, Kentouri M (2013). Lateral line deformities in wild and farmed sea bass (*Dicentrarchus labrax*, L.) and sea bream (*Sparus aurata*, L.) *Journal of Applied Ichthyology* **29, 1015-1021.**

30. Disease resistance of triploid trout

All-female triploid fish are advantageous in rainbow trout aquaculture due to sterility and the consequent superior filet quality, growth, and feed conversion achieved at reproductive size. Triploid fish are commonly produced by pressure or temperature shock of the zygote (induced-triploids, 3NP), but can also be produced by mating a tetraploid parent with a diploid (2N) parent (intercross-triploids, 3NC). Little is known about the disease resistance of 3NC fish. In this study, we measured survival of genetically-related 2N, 3NP and 3NC families after exposure to *Flavobacterium psychrophilum* the etiological agent of bacterial cold water disease (BCWD). The families used in this study originated from either an unselected commercial stock or BCWD resistant or susceptible line of rainbow trout. The overall survival of 2N fish was slightly higher than the respective 3NP and 3NC fish. Although 3NC fish tended to show higher survival than 3NP fish, this response was not sufficiently consistent to promote intercross production of triploids for increasing disease resistance. The survival of ten sets of 3NP, 3NC and 2N families, created from BCWD resistant and susceptible line parents, demonstrated overall similar inherent relative survival differences among the ploidy types both among families and between lines, although family differences in response to triploidization and triploidization strategy were observed. In summary, minimal survival difference between 3NP and 3NC families following experimental challenge suggests that innate resistance to *F. psychrophilum* is not substantially altered by the triploidization strategy and progress in family-based selective breeding of diploid fish for BCWD resistance will substantially translate into improved survival when triploids are derived either by shock treatment or intercross breeding.

Weber GM, Wiens GD, Welch TJ, Hostuttler MA, Leeds TD (2013). Comparison of disease resistance between diploid, induced-triploid, and intercross-triploid rainbow trout including trout selected for resistance to *Flavobacterium psychrophilum*. *Aquaculture* **410-411, 66-71.**

31. Progress towards triploid salmon farming

This study examined performance traits between diploid and triploid Atlantic salmon siblings within 44 full-sib families (produced by 15 sires and 44 dams) under commercial rearing conditions from first feeding to harvest. Survival did not differ between ploidy levels throughout the production cycle. Triploids grew faster (+ 30%) in freshwater, but slower during the seawater phase (- 7.5%), although overall growth was comparable between ploidy levels (SGR 1.17 vs. 1.18% /day). Triploids showed no visual deformity in freshwater but a significantly increased prevalence in seawater, mainly evident as jaw malformations and deformed vertebrae. However, severity of deformities was considerably lower than in previous studies, as was the occurrence of cataracts. Using fixed effect linear models the combined effect of deformity and cataract only explained 50% of reduced growth performance, suggesting that other factors were also contributing to reduced performance in triploids. These differences could be due to different nutritional requirements and environmental tolerances in triploids. Family differences were obtained for growth traits (weight and length). Family ranking for production traits was also consistent between diploid and triploid siblings. Harvest quality grading was high (> 99% superior) and flesh quality was comparable between ploidy levels, although triploids did have significantly higher PUFA levels at harvest. The study indicates the potential for superior triploid growth, and in conjunction with development of triploid specific diets may be sufficient in order to establish viable triploid salmon aquaculture.

Taylor JF, Sambraus F, Mota-Velasco J, Guy DR, Hamilton A, Hunter D, Corrigan D, Migaud H (2013). Ploidy and family effects on Atlantic salmon (*Salmo salar*) growth, deformity and harvest quality during a full commercial production cycle. *Aquaculture* **410-411, 41-50.**

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32. Selective breeding improves trout survival in farm trials

Selective fish breeding programs for disease resistance comprise an increasingly important role in aquaculture production and offer an additional management tool for reducing bacterial-caused disease losses. Bacterial cold water disease (BCWD) is one of the most frequent causes of elevated mortality in juvenile salmonids, and we have selectively bred three genetic lines of rainbow trout for varying resistance to BCWD. These lines, designated ARS-Fp-R (resistant), ARS-Fp-C (control) and ARS-Fp-S (susceptible), differ in survival following standardized laboratory challenges with the causative agent of BCWD, *Flavobacterium psychrophilum*. This study evaluated survival of the genetic lines in laboratory challenges and in a production environment. Evaluations of disease resistance demonstrated a reproducible, 30% or greater, survival difference between ARS-Fp-R and ARS-Fp-S lines at body weights ranging from 0.7 to 13 g. Farm trials were performed to evaluate survival over an 80-day growth period starting after the trout began feeding. After a BCWD epizootic, the ARS-Fp-R line displayed significantly greater risk-adjusted survival (95.7%) than the ARS-Fp-S line (91.2%, $P < 0.0001$) and the ARS-Fp-C line (92.4%, $P < 0.0001$). Phenotype stability in farm-trial fish was also evaluated using laboratory challenges. The ARS-Fp-R line consistently displayed a higher, but not always statistically significant, survival percentage compared to the other lines and the data suggest that the magnitude of the survival phenotype difference is sensitive to environmental influence. In summary, the overall greater survival of the ARS-Fp-R line provides evidence of genetic improvement under production conditions.

Wiens GD, LaPatra SE, Welch TJ, Evenhuis JP, Rexroad CE III, Leeds TD (2013). On-farm performance of rainbow trout (*Oncorhynchus mykiss*) selectively bred for resistance to bacterial cold water disease: Effect of rearing environment on survival phenotype. *Aquaculture* **388-391, 128-136.**

33. Fish in: Fish Out ratio (FIFO) less than 1

Adult Atlantic salmon (800 g start weight) were fed diets with a high replacement of fish meal (FM) with plant proteins (70% replacement), and either fish oil (FO) or 80% of the FO replaced by olive oil (OO), rapeseed oil (RO) or soybean oil (SO) during 28 weeks in triplicate. Varying the lipid source only gave non-significant effects on growth and final weight. However, a significantly reduced feed intake was observed in the SO fed fish, and both feed utilization and lipid digestibility were significantly reduced in the FO fed fish. Limited levels of dietary 18:3n-3, precursor to EPA and DHA, resulted in no net production of EPA and DHA despite increased mRNA expression of delta-5-desaturase and delta-6-desaturase in all vegetable oil fed fish. Net production of marine protein, but not of marine omega-3 fatty acids, is thus possible in Atlantic salmon fed 80% dietary vegetable oil and 70% plant proteins resulting in an estimated net production of 1.3 kg salmon protein from 1 kg of FM protein. Production of one 1 kg of Atlantic salmon on this diet required only 800 g of wild fish resources (Fish in - Fish out < 1).

Liland NS, Rosenlund G, Berntssen MHG, Brattelid T, Madsen L, Torstensen BE (2013). Net production of Atlantic salmon (FIFO, Fish in Fish out < 1) with dietary plant proteins and vegetable oils. *Aquaculture Nutrition* **19, 289-300.**

34. Net marine protein production in commercial study, but FIFO greater than 1

By feeding Atlantic salmon diets with 64% of the fish oil (FO) replaced by vegetable oil, and with decreasing fishmeal (FM) inclusion levels from 213, 178 and 143 g/kg in a full-scale experiment producing 3,100 tonnes fish, no significant negative effects on fish performance, health and product quality were observed. All dietary groups showed, however, moderate intestinal inflammation. Reduced growth and feed efficiency were seen with decreasing FM inclusion. Two dietary groups demonstrated net marine protein production, while none of the groups showed net fish production (FIFO ≥1.65) due to the equal low FO inclusion. High plant oil level gave lower fillet level of persistent organic pollutants (POPs) compared to surveys of the Norwegian market. The study gave predictable incorporation rates of essential n-3 long-chain fatty acids in the fillet. Cooked salmon fillet from all dietary groups showed minor differences in sensory quality. Based on the present full-scale production results, dietary FM inclusion down to 160 g/kg (accumulated) during the seawater phase, concurrent to replacing 70% of the FO with a suitable plant oil, is not regarded to represent any risk to fish performance, health or quality.

Waagbø R, Berntssen MHG, Danielsen T, Helberg H, Kleppa AL,

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Berg Lea T, Rosenlund G, Tvenning L, Susort S, Vikeså V, Breck O (2013). Feeding Atlantic salmon diets with plant ingredients during the seawater phase - a full-scale net production of marine protein with focus on biological performance, welfare, product quality and safety. *Aquaculture Nutrition* **19, 598-618.**

35. Floating trout faeces - a new approach for removing solids from effluents

The rapid removal of suspended solids from aquacultural systems is of utmost importance in maintaining healthy stock and system stability and in addressing environmental concerns. This research tested a new approach, successfully manipulating fecal density to the point of floatation. Fecal casts floating at the water's surface can be transported quickly to a removal device. The speed of removal minimizes opportunity for leaching, and exposure to shear forces and turbulence caused by mechanical devices and fish motion. Waste thereby persists as larger particles, which are easier to remove by traditional microscreens or skimming apparatus. Four different low-density feed additives were tested in different dosages and gradings on duplicate groups of rainbow trout, in order to appraise the effects on fecal density, and on growth and health of fish stock. The control groups received the same basal diet without additives, which resulted in fecal densities in the upper ranges expected for commercial trout diets. Five of the additive diets significantly reduced the density of both intestinal and water-soaked feces, with the most effective (cork; 0.5-1 mm; 2%) leading to floating feces. The larger grade of cork granules performed significantly better than the smaller grade. The possibilities for reducing levels of effective cork incorporation and enhancing effects on density by other quality improvements are discussed. Feed efficiency and fish health were not impaired by the additives. It is suggested that the systematic manipulation of fecal density with low-density additives may achieve economic and ecological advances and offer a new and effective means of managing and optimizing waste output from aquaculture. The effects of floating feces on removal efficiency, leaching effects, water quality and operating costs in aquacultural systems have to be further explored.

Unger J, Brinker A (2013). Floating feces: a new approach for efficient removal of solids in aquacultural management. *Aquaculture* **404-405, 85-94.**

36. Stocked brown trout don't eat wild salmon smolts

The predation impact of recently stocked triploid brown trout on migrating wild Atlantic salmon smolts was investigated in two field-based experiments. The first experiment employed a unique experimental facility to monitor 57 wild salmon smolts through an enclosure containing a known density of stocked trout to determine a predation rate. None of these smolts were preyed upon by the stocked trout. The second experiment investigated the diet of free-ranging stocked trout in a chalk stream during the spring. Although at least 6% of the free-ranging stocked trout became piscivorous on minnow, the results suggest that large, recently stocked, triploid brown trout with a high condition factor do not represent a predation threat to wild salmon smolts. However, it is recommended that a precautionary approach is maintained and the findings are not generalised until further investigation permits explicit management advice to be developed, and that the stocking of large triploid trout is avoided before May/June (regional variations to apply) each calendar year, where this can reasonably be achieved.

Riley WD, Davison PI, Ives MJ, Maxwell DL (2013). Do triploid *Salmo trutta* **stocked into a chalk stream in the spring prey on wild** *Salmo salar* **smolts?** *Fisheries Management and Ecology* **20, 346-353.**

37. Fish brain structure suggested to enable suffering

Three interrelated pallial areas mediate behaviors reflective of the cognitive and emotional aspects of the teleost mind. The dorsocentral area (Dc) has specific associations with both of the other pallial areas and projects to major lower sensorimotor centers. While Dc generally functions as an output or modulatory component of the pallium, it probably also has integrative features important for certain behaviors. The dorsolateral region (Dl) has dorsal (Dld) and ventral (Dlv) divisions. In association with the dorsal part of Dc, Dld processes visual information via a 'tectal loop' which is hypertrophied in certain coral reef species. The region also receives afferents related to other modalities. Functionally, Dld resembles the tetrapod sensory neocortex. Anatomical and behavioral data (i.e. involvement in spatial and temporal learning) strongly suggest that Dlv is homologous to the tetrapod hippocampus. The dorsal

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part of the dorsomedial area (Dmd) processes acoustic, lateral line, gustatory, and multimodal information. It has reciprocal connections with Dld such that the Dmd and Dld together can be considered the teleost nonolfactory 'sensory pallium'. Behavioral studies indicate that Dmd creates the 'fear' necessary for defense/escape and avoidance behaviors and controls several components of species-typical sexual and aggressive behavior (responsiveness, behavioral sequencing, and aspects of social cognition). While the functional results generally support the anatomical evidence that Dmd is homologous to the tetrapod amygdala, a case can also be made that Dmd has 'sensory neocortex-like' features. Understanding the interrelationships of Dl, Dmd, and Dc seems a necessary 'next step' in the identification of the neural processes responsible for mental experiences such as those of a unified sensory experience (Umwelt) or of feelings of discomfort versus well- being.

Demski LS (2013). The pallium and mind/behavior relationships in teleost fishes. *Brain, Behavior and Evolution* **82, 31-44.**

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Defra Aquatic Animal Health And Movements Announcements

Information from Sweden: A potential new disease of rainbow trout

The Swedish authorities have investigated a potentially new and emerging parasitic disease of rainbow trout farmed in freshwater. The disease, which caused significant mortalities at two fish farms has been attributed to a protozoan, possibly of the family Sarcocystidae. This family of protozoan had not previously been associated with disease in fish.

Whilst there is no evidence for the presence of the parasite in the UK, the purpose of this information note is to make fish farmers aware of the clinical signs of the disease. There is no evidence from the Swedish authorities of any risk to human health.

Please report any suspicion of this disease to the Fish Health Inspectorate.

[A Guide to Sarcocystis is provided in the Industry News].

August 22, 2013

Defra Announcements

Review of EU activity on agriculture and fisheries

We have launched new calls for evidence to hear from farmers and fishermen on how the EU has affected the UK national interest.

People with knowledge of the EU, farming and fishing industries have been invited to share their views on how the EU has affected the UK national interest.

These calls for evidence are part of the Government's Balance of Competences Review, an analysis of what EU membership means for the UK. The review is examining the scope of EU powers and the effects they have on the UK.

The Agriculture report will examine EU powers for the Common Agricultural Policy, plant health and forestry. The Fisheries report will examine EU powers for the Common Fisheries Policy, the management of fisheries and the farming of fish and shellfish.

Environment Secretary Owen Paterson said: "We want to hear from people with direct experience of what our membership of the EU means in practice. Our farmers and fishermen are affected by it every day, so I'd like to know what they think. Anyone involved in agriculture, forestry or the fishing industry will have a view, as will the thousands of businesses linked to them. This is a real opportunity to inform the national debate on Europe."

The calls for evidence will run for twelve weeks from 21 October 2013 to 13 January 2014. The final reports will be published in summer 2014.

The Balance of Competences Review is led by the Government in consultation with think-tanks, academia, businesses, Parliament, civil society and EU institutions. It aims to improve public understanding of the nature of our EU membership and contribute to the wider European debate about how to modernise, reform and improve the EU.

For more information please see Review of the Balance of Competences or join in the conversation on Twitter using #BOCReview

21 October 2013

River maintenance pilots begin

A new scheme to remove red tape and help landowners manage the risk of flooding has been announced by Environment Secretary Owen Paterson today.

In recent years wet weather has caused significant flooding in areas such as the River Brue in Somerset. But while river maintenance can make floods less likely in some areas, current rules mean that farmers who want to manage their own watercourses could be put off by bureaucracy.

The new River Maintenance Pilots are designed to see how existing rules can be simplified without damaging the local environment. Currently, landowners have to apply for permission from the Environment Agency before carrying out certain maintenance activities on rivers crossing their land. Under the pilots, farmers and landowners in seven areas in England at risk of flooding will be allowed to carry out work to desilt watercourses without needing to obtain a consent.

Environment Secretary Owen Paterson said: "I want to make it as simple as possible for landowners and farmers to carry out work to protect their land. Watercourse maintenance can reduce the risk of flooding, enhance the environment and improve water quality. These pilots will make sure that people who want to carry out this kind of work can do so without getting tied up in red tape."

Environment Agency staff in each pilot area will be on hand to provide advice, and new Good Practice guidance will ensure that all activities take environmental concerns into consideration when maintenance work is carried out.

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Environment Agency Chief Executive Paul Leinster said: "We want to make it as easy as possible for farmers to undertake appropriate maintenance work on rural watercourses, whilst still ensuring that wildlife and the environment are properly protected. We look forward to continuing to work together with farmers, environmental groups and others to reduce the risk of flooding."

The pilots will cover seven areas:

- Alt Crossens, Lancashire
- River Idle, Nottinghamshire
- Bottesford Beck, North Lincolnshire
- River Brue, Somerset
- Upper Thames, Oxfordshire
- Winestead Drain – East Ridings of Yorkshire
- River Duckow, Shropshire

The River Maintenance Pilots will be overseen by the Environment Agency and will last for one year. More information about the pilots and details of local contact can be found on the Environment Agency's website. Landowners and farmers will be able to start river maintenance activities according to the new guidance from 21 October.

The findings of the Maintenance Pilots will be used to develop a new improved system of consents for managing river maintenance by 2015, as part of the reforms being introduced in the Water Bill.

14 October 2013

River health gets £1.6 million boost

A new £1.6 million project to improve river health and water quality in England has been launched by the government today. The new partnership scheme, called the Catchment Based Approach, will encourage local communities and environmental groups to take on more responsibility for improving the health of their local rivers, as well as the surrounding natural environment and wildlife.

This follows a series of successful regional pilots which took place across the country including the Norfolk Coast, Bristol Avon and Poole. In Bristol, local authorities worked together to introduce new measures to reduce the need for dredging the River Avon and save taxpayers' money.

Natural Environment Minister Richard Benyon attended the launch at Singlers Marsh in Welwyn today. He said: "Rivers are the lifeblood of our country. They give us the water we need for our daily lives, and sustain our wildlife. That is why this new scheme is so incredibly important. Our pilot programme achieved great results and this new funding will help more people take action to improve the health of their local rivers. Ensuring we have enough water, not just for us, but for future generations is an issue of huge importance. Everyone has a part to play and can make a real difference."

Input from the Environment Agency, the River's Trust and water companies like Yorkshire Water have been vital in shaping the scheme. There will be just over 80 of these Catchments across England, supported by local, voluntary Partnerships.

Miles Foulger, Environment Strategy Manager at Yorkshire Water who was involved with a pilot project said: "Yorkshire Water is proud to have had the opportunity to pilot the government's new Catchment Based Approach as part of our ambition to achieve excellent catchments, rivers and coasts. Through the Don Network initiative we have built lasting partnerships with a range of stakeholders across South Yorkshire, and as a result we are already starting to see new projects to improve water quality come to life."

The scheme has been designed with flexibility for local communities in mind. It will ensure that local projects are targeted to address the specific water and natural environment needs in each catchment. The creation of these catchment groups will be helped by the initial funding.

At Singlers Marsh, work has been undertaken to improve the flow of the River Mimram, as well as removing accumulated silt from the river bed so that fish and invertebrates can access the river bed. This is exactly the type of approach the government would like to see.

Debbie Jones, Environment Manager at the Environment Agency, said: "We are delighted to be part of this joined-up approach to restore our rivers. Some excellent work has been carried out on the Mimram and the Beane already, and we would like to thank all partners, organisations and volunteers involved for the great work that has been done so far. It is a great thing to be in the position to say that our rivers are the healthiest they have been for two decades, but we are doing even more to further improve water quality and local biodiversity."

"Schemes like this, as well as the Love Your River initiative, are vital to help tackle low flows and pollution on our rivers but everyone has a part to play in

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this. Local people can help their rivers by being careful about their water usage and by installing water meters, then we can continue to work with water companies and communities to reduce the impact of abstraction on our chalk streams. Farmers, businesses and water companies can also still do more to reduce pollution to our rivers."

The Love Your River initiative, supported by Richard Benyon and rower James Cracknell is not just about educating people about the difficulties that many rivers face. It is also recognises the great work local groups already do to look after their rivers - honouring the community spirit and the inspirational individuals who give up their time and energy to improve their local environment. A new Love Your River blog has launched online today, highlighting why taking action to improve river health is so important.

The Environment Agency will work with local groups to ensure the lead for each Catchment Partnership is agreed collaboratively. More details on this will be available on the Agency's website later this month.

3 June 2013

Cefas Announcements

English marine finfish project: aquaculture operators being sought

Experienced aquaculture operators are being invited to tender for a demonstration project in coastal waters off southwest England, addressing the sustainable production of marine finfish.

A project team comprised of representatives from the Centre for Environment, Fisheries & Aquaculture Science (Cefas), the British Trout Association (BTA) and The Crown Estate (TCE) is seeking a commercial partner to help develop a "proof of concept" enterprise. This work will demonstrate the potential for net-pen production of rainbow trout in the coastal marine waters off Cornwall. It is believed that there is sufficient understanding about rainbow trout - farming principles, technical knowledge - and scope within the market for an enterprise producing this species in a net-pen facility to be viable.

Cefas' Neil Auchterlonie, Programme Director in Food Security and Aquaculture, said: "This multi-partner project is a very exciting initiative for aquaculture in England. There is potential for aquaculture to support UK government and regional aspirations relating to food security and regional economic development."

The project team is inviting expressions of interest from the aquaculture industry to operate at an agreed site as an independent business. The team, led by Cefas, will monitor the sustainability of that operation using a range of criteria and covering aspects such as environmental effects and fish health and welfare.

Dr. Auchterlonie continued: "This project should help support the long-term sustainable development of the marine aquaculture sector in English waters. Our model provides a platform for the sharing of information, stakeholder input and dialogue."

David Bassett, BTA Chief Executive, said: "There is clear market demand, both at home and abroad, for top-quality farmed UK trout. It is exciting to try to increase production through a novel collaboration with regulatory authorities and local interests. We are lucky to be able to start with best practice that has been developed over decades elsewhere, and to thereby avoid many of the problems faced in the past. Both fish farmers and those from outside our sector will be watching this project closely to see how it develops."

The project will support both the regional economy and the seafood supply chain.

Alex Adrian, Aquaculture Operations Manager at TCE, said: "We are pleased to be contributing to a project which will diversify and strengthen Cornwall's aquaculture industry, creating new opportunities for it to grow and succeed within a seafood sector that is developing rapidly."

An Information Notice document, providing further background details, may be downloaded from the websites of each of the project team's websites:

- www.cefas.defra.gov.uk/industry-information/aquaculture.aspx
- www.britishtrout.co.uk
- www.thecrownestate.co.uk/coastal/notices

13 September 2013

Cefas to chair Aquaculture Panel discussion at Oceanology International 2014

Dr Neil Auchterlonie, Programme Director for Aquaculture and Food Security at Cefas, will chair a panel discussion on Aquaculture at Oceanology International 2014, the global forum for marine science and ocean technology (11–13 March 2014, London Excel).

The discussion will cover key marine technology opportunities and challenges in the Aquaculture sector,

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connecting the latest scientific research with industry needs. The session will also identify potential cross-disciplinary marine industry opportunities such as remote-sensing, engineering and modelling – where Aquaculture may benefit from the progress that has already been achieved in other sectors.

Six technical and scientific experts comprise the Panel's Steering Committee, and they will guide discussions during the half-day session. Apart from Dr Auchterlonie, the other Steering Committee members are:

- Alex Adrian, Aquaculture Officer, The Crown Estate
- Dr Kenneth Black, Scottish Association for Marine Science
- Prof Peter Davies, Department of Civil Engineering, Dundee University
- Dr Mark James, Marine Alliance for Science and Technology in Scotland
- Prof Jimmy Turnbull, Institute of Aquaculture, University of Stirling

Dr Auchterlonie will bring insight on the developing science and providing technical advice to key policy decision-makers, such as Defra.

The Aquaculture Panel discussion is free to attend. Registration will be live on the conference website (www.oceanologyinternational.com) in early December. For more information regarding the Aquaculture Panel discussion, please contact Ellen Burgess, ellen.burgess@reedexpo.co.uk.

MMO Announcements

Review of the European Fisheries Fund in the UK 2012

The 2012 annual review for the European Fisheries Fund (EFF) in the UK is now available www.marine-management.org.uk/fisheries/funding/documents/eff-review2012.pdf.

The review highlights the work of EFF in 2012 and includes brief articles explaining how the scheme has benefitted the UK fisheries sector. The articles detail EFF-supported projects ranging from vessel modernisations improving the safety of local fishermen to multi-million pound port and harbour regenerations. EFF grants to help processing and aquaculture companies to expand and training programmes to benefit the UK fisheries sector are also featured.

The review also details how EFF is contributing to the sustainable development of fisheries areas in the UK through the creation of fisheries local action groups (FLAGs). FLAGs are committed to involving a wide range of people from their local community in their work to diversify their local economies.

The publication includes contributions from England's Marine Management Organisation (MMO), the Department of Agriculture and Rural Development (DARD) in Northern Ireland, Marine Scotland and the Welsh Government.

Examples of grants to the finfish farming industry in the report are:

- Expansion of organic salmon farm: The Northern Salmon Company in Glenarm was awarded £145,000 to purchase high specification moorings, cages and nets as well as outboard engines for personnel work boats. This enabled the company to achieve a higher biological output whilst remaining compliant with organic standards. The company subsequently exceeded its target to increase its production output by approximately 30 per cent to over 600 tonnes per year. (Axis 2: Aquaculture, inland fishing, processing and marketing of fishery and aquaculture products)
- Biological sea lice management project in Scotland: Shetland Aquaculture was granted just over £300,000 for a pilot project on biological sea lice management. The project is a collaboration between Shetland Aquaculture a non-profit trade body, NAFC Marine (part of the University of the Highlands and Islands) and a local salmon producer. The project will trial a new approach to the biological control of sea lice on a commercial basis aiming to provide an alternative to chemical control and improve the health and welfare of fish. (Axis 3: Measures of common interest, Pilot operations)

21 November 2013

European Fisheries Fund deadline extended

The European Fisheries Fund (EFF), in England, is to continue accepting applications until 30 June 2014, meaning that applicants can still take advantage of the funding available.

The EFF has already made a positive difference to the UK fisheries sector with over £90 million of European funding being committed to projects and fisheries local action groups (FLAGs) since the start of the scheme. The continuation of EFF into 2014 will give applicants a

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chance to access European funding between now and the start of the successor scheme, the European Maritime and Fisheries Fund (EMFF), the details of which are still being agreed.

EFF funding remains available for a range of projects including fishing vessel improvements, aquaculture, fish processing and port and harbour regeneration.

Michelle More, EFF Programme Manager says "The continuation of EFF is great news for applicants – this will allow them more time to take advantage of the range of funding available under the EFF scheme. There will be individuals and businesses in the UK fisheries sector that have good project proposals and can utilise the EFF funding available to help them turn their ideas into a reality. I would urge all potential applicants to contact their EFF teams in the first instance to provide guidance on funding options and the applications process. Although funding is still available under all strands of the scheme I would recommend that applicants don't delay in applying."

Applicants should note that the end date of 31 December 2015 by which time all projects must be completed remains unchanged.

For more information on applying for EFF grants, case studies and successful applicants visit www.marinemanagement.org.uk/fisheries/funding/eff.htm or contact the EFF Team on 0191 376 2694 or 0191 376 2676.

27 November 2012

Welsh Assembly Government Announcemencts

New plans to ensure healthy seas and a vibrant fishing industry

New plans aimed at ensuring the health of both Welsh seas and the Welsh fishing industry have been launched today by Minister for Natural Resources and Food, Alun Davies. Speaking in the National Assembly, the Minister launched Wales' first Marine and Fisheries Strategic Action Plan and set out how the Welsh Government would use its powers to manage Wales's seas sustainably and use them as a driver for economic growth in order to ensure the best long term outcome for the people of Wales.

Alun Davies said: "Marine and fisheries continue to be a priority for me. This plan is the beginning of the next phase of effective management of Welsh seas and aims to ensure that Wales has a sustainable marine and fisheries industry that we can all benefit from and be proud of. In order to reach this goal we know we need a real focus on ensuring that our seas are a healthy marine eco-system. It is this focus on healthy and diverse seas that will ensure that Welsh waters deliver the best long term economic outcome for coastal communities and the people of Wales more widely and will help us maintain and develop a vibrant and successful fishing industry."

As part of his statement the Minister reiterated his commitment to developing a Welsh National Marine Planning Process by 2015 to provide a basis for the sustainable use of Wales' marine resource. The Welsh Government will start engaging with its partners on this work over the next month. The Minister said: "I want to establish a marine planning system that Wales can be proud of and which says to the world that Wales is open for business in the sustainable use of our seas, whether that be for fishing, transport, tourism or renewable energy purposes."

In its Marine and Fisheries Strategic Action Plan the Welsh Government says it will:

- Create the right environment for new and existing businesses to prosper, in order to grow the coastal economy
- Simplify current administrative and licensing procedures
- Work with local marine and fisheries businesses to make sure they can fully utilise the European funds available, notably the European Maritime and Fisheries Fund (EMFF)
- Develop marine policy so that it supports 'blue growth'
- Aim to double Wales' annual finfish aquaculture output from 1000 tonnes to 2000 tonnes by 2020
- Aim to double shellfish production from 8000 to 16000 tonnes by 2020
- Continue to develop three Inshore Fisheries Groups across Wales to improve the management of fisheries and develop partnership working between Welsh Government and Fisheries
- Establish industry groups to manage fishing quota levels in the most effective Way

The Marine and Fisheries Strategic Action Plan sets

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out specific initiatives that the Welsh Governments will undertake to support marine and fisheries and also includes a timeline for activity.

26 November 2013

Scottish Government Announcement

Aquaculture website launched - Increase in transparency and decision processes

Information on Scotland's world renowned aquaculture will be easier to access with the launch of a new website and database (http://aquaculture.scotland.gov.uk/). The website will provide a central location for an integrated, geographic and up-to-date view of aquaculture activity in Scotland. The website also provides information about:

- industry location
- types of aquaculture
- leases, licenses and reports on controlled activities
- shellfish hygiene monitoring

It includes an interactive map which can be customised for area of interest; a searchable database of information about finfish farms and shellfish harvesting areas; a view of how farm sites, leases and licences relate together; and fully downloadable data for use in spreadsheets and analysis tools.

This is the result of a significant partnership project amongst the main aquaculture regulatory and administrative bodies in Scotland - Scottish Environment Protection Agency, Marine Scotland, The Food Standards Agency in Scotland and The Crown Estate.

The Environment and Climate Change Minister Paul Wheelhouse said: "Aquaculture was worth over £530 million to the Scottish economy in 2012 and is a key sector to underpinning sustainable economic growth. It provides high quality and secure employment particularly in our rural and coastal communities and has significant potential to contribute further. This website and database will see information being shared that will enable better informed decisions to be made in view of all aquaculture activity. The Scottish Government fully supports the aquaculture industry's ambition for sustainable growth with due regard to the marine environment – as demonstrated in our Aquaculture and Fisheries (Scotland) Act 2013. This will enable the aquaculture industry to deliver on its 2020 growth targets as set out in the recent Marine Plan Consultation document. I look forward to engaging further with the sector and key stakeholders on the development of the sector through the Ministerial Group on Sustainable Aquaculture."

October 01, 2013

Federation Of Veterinarians Of Europe (FVE)

FVE Seminar Conclusions: "Caring for health and welfare of fish: A critical success factor for aquaculture"

"Fish, as other food producing animals, get sick, their welfare can be compromised and the food they produce has to be healthy. Veterinarians, through education and experience, have a holistic view on how health, welfare and the environment interlinks and therefore have a key role to play within aquaculture. Vets care for people and animals, including fish. It is essential to ensure that sufficient veterinary expertise is available to the aquaculture sector." emphasized FVE President Dr. Christophe Buhot at the conference the Federation of Veterinarians of Europe organized on aquaculture.

The event attracted more than 150 people from European Institutions, National Authorities, veterinarians, fish producers, scientists and many other stakeholders as well. This large number of participants underlined the enormous interest our society takes in aquaculture, which is a fast growing sector. The EU is not self-sufficient in fish products and requires imports from third countries. There is a significant potential in EU for increasing production in aquaculture, both in terms of capacity and exploitation of new species. This growth should be encouraged and supported at national and EU levels.

The large diversity of fish species being kept, each with their own specific needs, should be taken into consideration when regulating the sector. Close collaboration between the aquaculture industry and the veterinary profession should be ensured, in order to guarantee optimal health management of fish farms at all stages of production and to put in place sustainable and viable solutions for the future.

Lack of availability of veterinary medicines specific to fish is a problem in the EU. The medicines legislation review should try to ensure incentives to encourage the development of these medicines.

FVE organized this conference in Brussels, 16-17 May 2013, in association with the Irish Presidency of the Council and the support of European Commission,

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Directorate-General for Health and Consumers and Directorate-General for Maritime Affairs and Fisheries. All presentations given during the conference and the conclusions reached are available online (www.fve.org/news/presentations.php) and the Conference Conclusions were:

- We need to acknowledge the extended diversity in fish species, in order to be in a position to propose and put in place sustainable and viable solutions for the future.
- Veterinarians are the experts in animal health and welfare, including fish. It is essential to ensure that sufficient veterinary expertise is available to the aquaculture sector. This will also ensure food safety and protect public health.
- Close collaboration between the aquaculture industry and the veterinary profession should be ensured, in order to ensure optimal health management of fish farms at all stages of production.
- Effective epidemiological monitoring is essential for the appropriate health management of fish-farms and shall be supported by the development of specific diagnostic tests. This will also underpin biosecurity of farms.
- Research on fish vaccines and antiparasitic medicines should be promoted.
- Research on alternative innovative non-medical treatments should be encouraged as well.
- Availability of veterinary medicines specific to fish must be ensured throughout Europe. Any review of the relevant legislation must ensure incentives and adequate return on investment to encourage the development of these medicines.
- Antibiotics for fish are POMs and must be prescribed by a veterinarian for the fish under his/her supervision.
- Industry and veterinarians should collaborate on best practices and vaccination programmes in order to prevent the development of antimicrobial resistance.
- Risk-based controls of animal movements should be enforced, particularly concerning imports from third countries, in order to avoid introduction of new pathogens that may threaten the health of local aquatic species.
- The EU is not self-sufficient in fish products, and requires imports from third countries. However, there is a significant potential in EU for increased production in aquaculture, both in terms of capacity and exploitation of new species. This growth should be encouraged and supported at national and EU levels.
- It is important not only to acknowledge the wide diversity of fish species, but also to encourage the growth of the different varieties of aquaculture. Research must be supported and targeted towards all the different species.
- The particular needs of aquatic organisms during their handling, transport or slaughter must be addressed by legislation.
- We call on the EU Commission to put more emphasis on fish welfare standards in the Commission's Animal Welfare Strategy.
- Veterinary schools should be encouraged to include in their curricula aquatic veterinary disciplines and/or training programmes, in order to ensure a high level of knowledge, skills, and competencies of the graduate. This is particularly important in EU countries where aquaculture is a significant food producing industry.
- Licensing of fish farms should be based on scientific knowledge and sustainable farming practices. To this end, state officials involved in this work must have adequate education and knowledge of the field.

The British Aquaponic Association (BAQUA) www.baqua.org.uk

The British Aquaponic Association(BAQUA) is a Community Interest Company with the mission to use aquaponics to create and promote food security, health, environmental, social and economic benefits for all communities in the UK and abroad.

Growing fish and plants together

Aquaponics is a sustainable form of food production in which plants and fish are grown together in a closed, constructed system for their eventual consumption. It involves the marriage between aquaculture and hydroponics, with the plants, bacteria and fish working in symbiosis with each other in a vigorous growing environment similar to a natural ecosystem.

In an aquaponic system, nutrient-rich waste water – from fish reared in tanks – is used to feed the plants cultivated in hydroponic grow-beds. Beneficial bacteria found naturally act as a bio-filter, converting the am-

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monia in the waste water to a form of nitrates able to be utilised by the plants. This is a filtering process which also removes fish effluent, algae, leftover fish feed and other by-products from the water, allowing freshly cleaned water to be recycled back into the fish tank. The air in an aquaponic system is recycled too. Fish give off carbon dioxide which is absorbed by the plants; and in turn the plants give off oxygen. Essentially, every waste product in an aquaponic system is an input in another part. A series of pipes, irrigation fittings, stands and water pumps enable these procedures.

Strategy

British Aquaponics (BAQUA) is a Community Interest Company with the mission to use aquaponics to create and promote food security, health, environmental, social and economic benefits for all communities in the UK and abroad.

BAQUA will use aquaponics to achieve the following aims:

- Promote and facilitate the production of sustainable edible plants and fish.
- Improve food security.
- Revitalise unused buildings and/or urban and rural land.
- Create income-generating and skill-building opportunities for vulnerable groups.
- Link people together and strengthen community networks.
- Raise awareness and educate people on its benefits.

BAQUA has three strategic areas of working:

- Promotion and Income Generation
- Social Enterprises
- Research and Education

All three strategies will comprise of a series of objectives that will help BAQUA to:

- Achieve their aims
- Contribute to their vision

Community Interest Statement

BAQUA is a Community Interest Company (CIC). A CIC is a limited company with special additional features, created for the use of people who want to conduct a business or other activity for community benefit. The assets and profits of a CIC must be dedicated for these community purposes. Registration of a company as a CIC has to be approved by a Regulator who also has a continuing monitoring and enforcement role to ensure these community benefits are met.

BAQUA intends to use aquaponics to benefit the general UK population. More specifically, they will set up social enterprises, using aquaponics to benefit key groups, both in the UK and internationally.

BAQUA will provide three key groups in the UK with support, skills and knowledge on aquaponic food production that will have the following benefits:

- Provide people with disabilities with an income generating activity.
- Provide disadvantaged youth and adults (ex-offenders) with an income-generating/diversionary activity.
- Provide communities with locally grown food, a chance to revitalise unused buildings or land, and strengthen community ties.

They will also provide people with disabilities and women in developing countries with the same support, skills and knowledge on aquaponic food production, to improve their food security and give them access to a new livelihood. Support will be provided as part of a microfinance scheme or development project.

Aquaponic Conference

Friday 7th March 2014, Bicton EaRTH (Devon, EX9 7BG)

The British Aquaponics Association (BAQUA CIC) is hosting a conference at Bicton EaRTH.

This is BAQUA's second conference. BAQUA believes that organising an annual conference is imperative to bring together the UK aquaponic community and provide information on regional aquaponic developments. The conference will consist of both morning and afternoon presentations from notable speakers in the aquaponic, aquaculture, hydroponic and permaculture sectors. Lunch and drinks are included in the ticket price. There will be time for networking and meeting the BAQUA team during lunch and coffee breaks.

Speakers include:

- Kevin Frediani, Bicton EaRTH – "Fossil free farming"
- Jimmy Hepburn, Aquavision – "Aquaponics place in the aquaculture industry"
- Keith Jeffery, Cefas – "Fish health and water quality issues in aquaponic systems"
- Tom Webster, GrowUp – "Our story"
- Alice Archer, The Bristol Fish Project – "The highs

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and lows of starting an urban aquaponic system"
- Stephen Pritchard, Edible Landscape LLP – "How aquaponics can fit into permaculture"
- Speaker TBC – "Commercial hydroponics and how it relates to aquaponics

Please note the conference is open to everyone. Spaces at the conference are limited and will be filled on a first-come, first-served basis. For more information, please see:
- http://www.baqua.org.uk/ or
- http://us6.campaign-archive2.com/?u=d428338b7d298e7944c6a009f&id=dcef55f0ce
- or email chrissy@baqua.org.uk

Imares Wageningen Announcement

New project: SpaceTaste, to reduce the 'earthy' taste of farmed fish

An EU project entitled 'SpaceTaste' is to investigate ways of reducing the musty, earthy flavour ('off flavour') of fish farmed in recirculating aquaculture systems (RAS). A good solution has not yet been found, despite repeated studies of 'off flavour' in farmed fish.

What is 'off flavour'?

'Off flavour' refers to unwanted flavours and/or smells in food. In the case of aquaculture products, it usually means the musty, earthy taste caused by geosmin and 2-methyl isoborneol (MIB) in fish tissue. 'Off flavour' occurs in fish farmed in land-based aquaculture production systems with high nutrient levels, such as pond systems and RAS.

Economic impact

'Off flavour' in farmed fish is economically bad for the aquaculture industry. The unpleasant taste means that consumers buy less fish. Furthermore, it is expensive to remove 'off flavour' before bringing the product onto the market.

Three priorities

The project has identified three priority areas to reduce 'off flavour' in fish farmed in RAS:
- Prevention strategy: reducing the microbial production of geosmin and MIB in aquaculture production systems;
- Curative strategy: removing geosmin and MIB from fish cultivation water;
- Alternative strategy: optimising the purification process.

September 24, 2013

Fishupdate.com Announcements

Scottish aquaculture firm looks at chips for healthier fish

A Scottish aquaculture firm is leading the world in applying state-of-the-art genetics technology to salmon to produce more robust, disease-resistant fish.

Landcatch, based at Ormsary in Argyll, has now taken delivery of the first batch of SNP Chips, cutting-edge genomic selection tools that will allow their scientists to take the next step in pinpointing inherited traits in individual fish DNA. SNP Chips are glass slides used to analyse variations in DNA sequences, or Single Nucleotide Polymorphisms (SNPs), which act as biological markers and help scientists locate a range of genes associated with disease resistance. Genomic selection using SNP Chips is already routinely applied in crops, cattle, pigs and chickens but Landcatch is the first company to apply the science to salmon.

Landcatch supplies genetic services and Atlantic salmon eggs and smolts to the aquaculture industry. It uses selective breeding to develop strains of salmon which can perform to ever higher levels at every stage of production from eggs to adult fish. The firm is part of the global Hendrix Genetics multi-species food production organisation whose mission is to help the world meet its food needs through innovative and sustainable genetic techniques which inform their breeding processes.

Dr Alan Tinch, director of genetics at Landcatch, said: "The chips are now ready to use on Landcatch fish. We will be starting right away working out the best way of using them, and in 2014 they will be routinely deployed in our Scottish programme to improve sea lice resistance and other traits in salmon. At the same time we will begin to use the new technology in Landcatch breeding programmes in Chile to improve the traits important to our international customers. We are the first salmon breeding company to be doing this. We have done a lot of background work to get to this point and now it's time to start the real evaluation on Scottish salmon. It's a new chapter in a very exciting story."

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The chips are used to correlate variations in SNPs with performance. There are many millions of markers in every species, and these can be used as milestones on the DNA map. Scientists, who previously examined only five markers for one salmon gene, can now interrogate 250,000 markers to look at 20,000-30,000 genes. The technology means Landcatch geneticists are now able to get a much more detailed, digital-quality description of the genetics of individual fish. Previously, accurate information required measuring many thousands of fish over many generations. But now the best fish for breeding can be identified very quickly using hundreds of thousands of SNPs for each fish.

The work to develop the SNP Chips, led by Dr Alastair Hamilton of Landcatch, is being undertaken with a number of commercial and academic partners, including Edinburgh University (Roslin Institute and the GenePool Laboratory), Stirling Institute of Aquaculture, Glasgow University and Affymetrix Inc, with support from the UK Technology Strategy Board.

The arrival of the SNP Chips is another landmark for Landcatch which in 2007 was the first aquaculture company to be involved in work to pinpoint a gene controlling resistance to Infectious Pancreatic Necrosis (IPN) which poses a major threat to Atlantic salmon. The company later also proved that sea lice resistance is inherited, subsequently producing juvenile fish which were less susceptible. This allowed breeding from selected pedigree families and increased genetic resistance in each new generation. Work by Landcatch and its partners in this field means it is getting ever nearer to becoming the first in the world to locate the genes that determine how susceptible individual Atlantic salmon are to certain diseases.

It is on target to have this science for sale and already applied to their salmon eggs by 2014. In what will be a major breakthrough for the industry, eggs and smolts will then be produced to selectively breed healthier, disease resistant salmon and other fish as the technology can cross over to other species. The work accelerates the pace of progress and will help breeders and researchers examine traits in individual fish and better understand their general survivability, omega-3 level and grilsing – or maturing – rates. It will mean improved quality products and an acceleration of genetic techniques in farmed fish which the industry and commentators, including the former UN Secretary General Kofi Annan, believe is necessary to address world food shortages caused by climate change.

31 January, 2013

Fish anaesthetic gets marketing authorisation in seven countries

In the past few months PHARMAQ has received national marketing authorisations for Tricaine Pharmaq for the United Kingdom, Ireland, Norway, Iceland, The Faroe Islands, Spain and Italy.

"Appropriate anaesthesia can provide benefits for a wide range of fish handling operations, helping to safeguard fish welfare and also improving operator safety during processes such as vaccination," said Dr Ben North, Managing Director of PHARMAQ Ltd.

Tricaine Pharmaq will replace the former product PHARMAQ MS 222, a compound well known to the industry and which held marketing authorisations in the UK and Ireland for many years. The formulation of the product remains the same (100% active tricaine methanesulphonate) and is available by prescription.

Tricaine Pharmaq is readily soluble in water, making it safe and easy to use, with no requirement for solvents. Tricaine Pharmaq can benefit all sectors of the aquatic industry, from tranquilisation of ornamental fish during transport, through to full anaesthesia for surgical procedures, as well as anaesthesia of food fish at vaccination and egg collection from brood fish. PHARMAQ UK will be the distribution centre for all of the different markets.

"This is a great opportunity for PHARMAQ to introduce an established, safe and efficacious anaesthetic to support our customers in more of the markets where our fish vaccines are already being used", added Dr North.

29 May, 2013

Fishnewseu.com Announcements

Trout talks lead to ASC

The Freshwater Trout Aquaculture Dialogue has handed over the global freshwater trout standards to the Aquaculture Stewardship Council (ASC). This is the sixth standard ASC has received and joins those for tilapia, pangasius, bivalves (mussels, oysters, clams, scallops), abalone and salmon. There are currently over 250 tilapia and pangasius products in 10 countries available using the ASC logo.

Chris Ninnes, ASC's CEO, is delighted that yet an-

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other important milestone has been reached, stating: "On behalf of ASC I would like to thank the hundreds of dedicated individuals who have participated in the multi-stakeholder dialogues. Their hard work and commitment resulted in this very credible global standard for responsible trout farming. We are now eager to move forward with the pilot testing shortly and to launching ASC certified farmed responsibly trout into the market in 2013." There has been rapid uptake by the market to use certified products with the ASC logo and eager anticipation for new species as they emerge.

The ASC say that the freshwater trout standard is keenly anticipated by the market. A clear indicator of the enthusiastic response it has received is reflected in the warm welcome by Gottfried-Friedrichs, Germany's leading quality seafood brand. "FRIEDRICHS is looking forward to the ASC-certification of trout farms later this year," said Marketing manager Kathrin Runge. "We are preparing for the certification with of our suppliers and internally and want to launch ASC-certified trout in the European market as soon as possible."

The confidence in the ASC and the trout standard is similarly strong from the farming sector. Brian Thomsen, Director of The Danish Aquaculture Organisation, has been quick to express his commitment: "We are delighted to learn that the global standards for responsible farming of freshwater trout have passed yet another historical milestone with the hand-over to the Aquaculture Stewardship Council. Our fish farmers and processing companies are set to go. We believe there is a strong and growing demand for responsibly farmed fish and we remain committed to spearhead this development to the benefit of consumers and society."

Rainbow trout farming is one of the oldest forms of aquaculture in the world. From its North-American origin, rainbow trout have been introduced to more than 82 countries worldwide. In Europe trout is mainly farmed in France, Italy, Denmark, Spain, Norway, Turkey, UK and Germany, while outside Europe, large production takes place in the USA, Iran and Chile. For ASC, this means new production territories besides Asia and South America. Worldwide production of freshwater trout is estimated at 750,000-800,000 tons and is steadily growing. A variety of production systems are used, ranging from cages in lakes, to pond culture and flow-through and recirculation systems. Trout are marketed as whole fish, fillets and various smoked and canned products. Farming of trout can have negative impacts on the environment and society and the ASC standards address issues such as disease prevention, minimizing the outflow of nutrients from the farm, responsible use of water and preventing escapes.

"Considering half of the seafood we eat comes from a farm, and consumer demand is only increasing, it is imperative to have a credible aquaculture standards that will help protect the world's aquatic environments and the people who depend on them for generations to come," said Jose Villalon, VP of Aquaculture at World Wildlife Fund and Chairman of the ASC Board. "Based on its rigorous development and implementation processes that convene voices from across the value chain, I'm confident the ASC freshwater trout standard will achieve that vision."

The Freshwater Trout Aquaculture Dialogue began in 2008 and was one of eight similar processes for internationally traded farmed seafood that had significant environmental and social impacts. They were facilitated by WWF. The Dialogues were comprehensive multi-stakeholder processes that sought innovative approaches to address industry impacts. The Dialogue involved farmers, conservationists, scientists, seafood buyers, processors, government officials and other interested stakeholders.

Margreet van Vilsteren, Project Manager of the Sustainable Seafood North Sea Foundation (Stichting de Noordzee) and member of the Trout Dialogues, said: "The North Sea Foundation has gladly contributed to the development of the ASC standard for trout. We now welcome it as a major step towards responsible aquaculture that promotes a sustainable fish feed industry and actively support its promotion through the Seafood Guide, which is widely used by consumers."

Preparation for ASC's pilot testing of the draft Trout Audit Manual (a guiding document for farms and auditors) is underway and will start over the coming weeks in collaboration with producers globally. The results from the pilots will be fed into the final Trout Audit Manual. Certifiers that want to perform audits must first comply with a set certification procedures independently administered by Accreditation Services International to demonstrate their competence. All auditors must also pass a training course focused on the trout standard and this will be scheduled shortly after the Audit Manual has been finalised. ASC certified trout is expected to be available in the market before the end of 2013.

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ASC certified salmon products are expected in 2013 and these products will be followed by market launches for certified clams, mussels, scallops, oysters and abalone. The ASC anticipates delivery of the shrimp standard by mid-2013, and the combined standard for seriola and cobia is expected to be finalised before the year end. Certified volumes for the latter three species can be expected in 2014.

20 February 2013

Room for improvement in salmon sector

A Norwegian PhD student has claimed that the salmon industry can increase efficiency and reduce costs by optimising physical pellet quality and feeding equipment. The claim was made by Maike Marlene Oeheme, who defends her PhD thesis at the Norwegian University of Life Sciences (UMB) on March 1. Her PhD project was financed by CREATE (Centre for Research-based Innovation in Aquaculture Technology, SFI) and was carried out at Nofima in Sunndalsøra.

In it, Oeheme identifies the following factors as important in achieving cost efficient production and to fully utilise valuable feed resources: high physical feed quality, optimisation of feeding systems, good spreading of the feed in the sea cages and minimising feed loss.

Oeheme's project has increased the knowledge of utilisation of feed resources by reducing feed spill in salmonid farming, and the interaction between physical and nutritional quality of the feed. She studied the formation of dust and small particles from feeds of different physical quality in a feeding system, in which air is used to convey the feed in a tube system from silo to cages, at different feeding rates and air speeds. She also studied the spreading of feed pellets in a sea cage using two different spreaders and different settings on the feeding system. Furthermore, she has studied the interaction between physical and nutritional quality of feed, and how this interaction can affect feed intake and feed utilisation. Her PhD project has also focused on the prediction of the biological value of feeds based on the physical quality of the feed.

The main conclusion of Oeheme's thesis is that optimising both physical feed quality and feeding equipment may reduce feed spill and increase feed intake in salmonids. The study also found that feeds with high physical quality that are optimised for minimal dust formation may have a negative effect on feed intake.

"It is therefore important to focus on the interaction between the physical quality of feed and feed intake. However, there is still a need to further develop analytical methods to study this interaction," says Dr Turid Synnøve Aas at Nofima. She has been a supervisor for Oeheme's PhD project along with Dr Mette Sørensen (Nofima, UMB), Dr Torbjørn Åsgård (Nofima), Dr Bendik Fyhn Terjesen (Nofima), Tore Andreas Samuelsen (Nofima) and Dr Kjell Arne Rørvik (Nofima, UMB).

27 February 2013

Aquaculture engagement blueprint published

A new guide, which is aimed at informing local communities how to engage with fish farm expansion and development proposals, has been published by the Sustainable Inshore Fisheries Trust (SIFT) – a new Scottish charity dedicated to promoting the economically and environmentally sustainable use of coastal waters.

Drawn up with the assistance of Fish Legal and the Salmon & Trout Association (S&TA), the Aquaculture Information Pack's primary focus is coastal salmon farms. It is particularly relevant to the planning system for aquaculture development and it contains full details on the roles of relevant statutory and other organizations, where information can be found and what the data means.

Charles Millar, Director of SIFT, said: "The whole planning process regarding aquaculture can be an incomprehensible minefield to communities and members of the public who seek to have their voices heard effectively. The aquaculture industry's side is inevitably presented and promoted by professionals and the Pack should enable communities to present their views and concerns effectively, thus helping to redress the balance in the planning process."

SIFT Chairman and Fish Legal solicitor Robert Younger commented: "For too long many communities in western Scotland have been essentially marginalized by the impenetrable complexities of the planning and regulatory system for salmon farming. The aquaculture companies, with the blessing of Scottish Government, aim to increase production by an average of 3-5% per annum over the next five years. As a consequence there will inevitably be a plethora of plans for new farms and the expansion of existing farms. If local communities are to get involved in such plans and become empowered, they will need the best information available. The SIFT Pack provides the tools vital for engaging in the process."

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Guy Linley-Adams, Solicitor to the S&TA Aquaculture Campaign, said: "Many people on the west coast and in the islands of Scotland appreciate that poorly-located fish-farms can damage wild fisheries. Others want to protect landscape, public rights of navigation or other nature conservation interests from the harm that aquaculture can do. This pack is designed to help those people have a realistic chance of being heard and have their views taken seriously in the face of overwhelming central Scottish Government support for the expansion of fish-farming."

The 69-page Pack also contains draft sample letters for communities to use as well as case studies of successful local campaigns. The Pack is at www.sift-uk.org and hard copies are also being made available to west Highlands and Islands communities.

01 March 2013

Trout farmer scoops Lantra award

A young trout farmer has won the Lantra Land-Based and Aquaculutre learner of the year award, which recognises the achievements of learners in the land-based and environmental sector across Scotland. Among the many highlights of the ceremony and gala dinner was the presentation of the aquaculture award, sponsored by Marine Harvest, Dawnfresh, the British Trout Association, the Scottish Salmon Producers Organisation and the Scottish Salmon Company. The winner was named as Jamie Hesketh from Parkgate in Dumfries.

Jamie studied a National Certificate in Aquaculture and Fisheries Management at Barony College and now works at Brow Well. He says: "Fish farming provides a great opportunity to work outdoors. It's good to see the end result of the hours put in on the fish farm when I speak to satisfied fishery owners and anglers." Jamie has achieved a number of additional certificates including quadbike handling. Jonathan Jowett of Brow Well Fisheries, who nominated Jamie, praised his enthusiasm and determination to enhance his skills and employability: "He's a motivated young man who knows what he wants and makes it happen."

Other awards were presented in areas such as fisheries management, equine, agriculture and horticulture and the standard of entries this year was particularly high. Head Judge Peter Alexander said: "Lantra has been celebrating learners' achievements in the land-based and environmental sector since 2003. These awards are vitally important in recognising the success of learners from across Scotland, and also act as a source of inspiration for those considering a career in this diverse and rewarding sector. I would like to congratulate all of the entrants on their hard work."

Valerie Owen OBE, Lantra's Chair, added: "I applaud all the finalists who show a real passion and dedication to training and the land-based industries. These awards attract the top learners from across Scotland every year who are committed to developing their skills and knowledge. It is vital for the future of these industries and for the wider Scottish economy that we continue to encourage and support new entrants."

08 March 2013

Conservation and trout consumption

The British Trout association (BTA) is thrilled that the Marine Conservation Society (MCS) has chosen to promote trout as the "fish of the month" for April. As part of the promotion the MCS has posted a recipe for trout with hazelnuts and sage, which was developed by C J Jackson of the Billingsgate Seafood School, on their website.

The BTA is proud that MCS are keen to acknowledge the importance of farmed fish in the sustainability agenda. Many do not understand all of the issues that surround fish farming – or operate with only a hazy knowledge of a farming system that changed so long ago it would be unrecognisable to the modern fish farmer – and BTA is only too happy to work with groups like MCS that are keen to promote sustainable fish farming.

MCS carefully consider issues such as feed sustainability, husbandry systems and environmental impacts in their fish assessments – and so trout farmers are keen to let everyone know of this endorsement they have provided us through selecting trout to be their fish of the month.

05 April 2013

Angling disinfection station opened

Fergus O'Dowd launched Ireland's first purpose-built disinfection station at Ballyhoe Lake, in Co. Cavan last night. The facility was developed by IFI, in cooperation with Interreg IVA (CIRB), IADA and the local Meathhill Angling Club.

The station will facilitate the disinfection of angling equipment on entry to the lake the helping to ensure that unwanted alien invasive species and harmful fish

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pathogens can be kept out of our natural fisheries. This development will also provide a template for further such facilities on fishery watercourses throughout the country.

The disinfection station is located at the entrance to Ballyhoe Lake, a prime Irish specimen tench fishery. The entrance gate and the disinfection station are secured with combination locks, the numbers for which are available through nominated members of the Meathhill Angling Club. Contact numbers for these members are provided on the tank. Members of the club will replace the disinfectant and manage the facility locally, as necessary.

Once opened, the tank contains a disinfection container for boots, keep nets, landing nets and stink bags. Disposable gloves are provided for angler use while disinfecting. A brush is available to scrub boots, and a spray bottle for boats coming onto the lake.

Signage adjacent to the tank and underneath the lid of the tank provides step-by-step instructions for the angler. Once the gear has been disinfected, the anglers apply a tag to his/her net to show that the process has been completed. Different colour tags will be utilised at the discretion of the operators.

Congratulating Meathhill Angling Club and IADA, Minister O Dowd commented: "Angling clubs and federations the length and breadth of Ireland are key to the protection of our angling resources. By providing facilities such as this, we are adding to the goodwill and community commitment of Meathhill Angling Club to protect their fishery, while also ensuring access to it. This access helps to safeguard the sustainability of our valuable resource which will continue to bring much needed revenue to the local community through responsible angling activity. I can't emphasise enough the role anglers and clubs have in the front line in the fight against invasive species which supplements the great work in the area carried out by IFI with the support of representative bodies such as IADA."

04 April 2013

Seafood is a key iodine source

New research from Surrey and Bristol Universities has highlighted the importance of iodine for pregnant women and new mums who are breast-feeding their children. Seafood is one of the best natural sources of iodine, but consumer awareness of its health benefits is virtually non-existent.

Surrey and Bristol University research, as reported in the Lancet, (22 May), examined 1000 pregnant women and found that women who had too little iodine in their bodies had children who grew up to have slightly lower IQs at the age of eight and worse reading ability aged nine. The researchers' advice, published on the British Dietetic Association website, recommends that pregnant and breastfeeding women need 250 micrograms per day and other adults need 150mcg.

Heather Middleton, Marketing Manager from Seafish's Fish is the Dish, explains: "It's essential for our bodies to get a good iodine intake as it makes thyroid hormones which our brains need to develop. Most consumers get enough iodine from a normal balanced diet which would include eating two portions of fish per week, one of which should be an oil rich fish like mackerel or salmon. Women who are pregnant or those looking to start a family often have iodine deficiency and their health professional will advise them to increase their iodine levels so they can pass on the very best nutritional benefits to their unborn child. One of the best sources of iodine is in white fish like cod, coley, haddock or hake and by eating these mums-to-be will also be topping up their systems with a whole host of vitamins and minerals like Vitamin D, Omega-3 and Zinc."

Eating healthily in pregnancy is vitally important and that is one of the reasons Seafish launched its Fish is the Dish campaign in October 2011. Aimed at families, Fish is the Dish shows how easy and quick seafood is to cook at home. For further information about the health benefits of eating seafood visit

23 May 2013

Producers sign sustainability pledge

Associations representing 70,000 employees and over €2 billion in European farmed fish production today signed a declaration of five principles upon which the aquaculture industry should be handed down through the generations in the best possible economic, social and environmentally sustainable state.

Ireland's Minister for Agriculture, Food and the Marine, Mr Simon Coveney, who currently chairs the EU Fisheries Council, witnessed the event at a gathering of fish farmers from 23 countries in Malahide, to the north of Dublin, which was hosted by the Aquaculture Section of the Irish Farmers' Association (IFA).

IFA President John Bryan welcomed the commitments by the group and commended the industry on

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moving so fast in such a short space of time in achieving the highest standards and in playing a significant role in a self-sufficient Europe.

The Principles in "Streaming Sustainability" to guarantee that the next generation of European aquaculture producers inherit a fully sustainable industry rest on:

- Clean Water Resources
- A Healthy Environment
- A Science-based Profession
- Partnership with policy makers and decision takers
- Respect for the Consumer

The Federation of European Aquaculture Producers, who will also hold their 45th AGM in Dublin this weekend, represents the interests of marine and freshwater producers of species such as salmon, trout, carp, bass, bream and others from Iceland to Israel. FEAP President, Arnault Chaperon, said that the declaration represented a mature and responsible commitment to the future by the Federation and its members.

23 May 2013

Certification standards explained

Seafish has launched 'A Guide to Seafood Standards', a web-based resource which compares and contrasts the different certification standards that apply to fish and shellfish supplied in the UK.

Paul Williams, chief executive of Seafish, said: "As the seafood industry has increased its emphasis on responsible sourcing, many more suppliers are using certification schemes to underline quality and ethical practice. This focus on improvement is great news both for consumers and for our industry, but the proliferation of different schemes can also sometimes be confusing. That's why we set out to create a new web resource to put all the information on the different standards in one place, so that users could better compare their features and benefits."

The Guide to Seafood Standards provides detailed information on all the certification schemes currently relevant to seafood, many of which also appear on product labelling and menus. It incorporates an interactive tool which describes how each standard is applied and the criteria used to measure factors such as food safety, environment, animal and social welfare.

The launch of The Guide follows the MCS's reclassification of mackerel, just five months after it was removed from the safe to eat list, which highlights how confusing sustainability ratings can be for consumers and industry.

Williams added: "Standards are a vitally important way of certifying performance against set criteria, although as yet there is no statutory requirement for equivalence and the schemes vary in the factors they cover. We hope that by providing more information this new Guide will increase understanding of this important facet of our industry and so help to 'demystify' the schemes for users."

Chris Leftwich, of the Fishmongers Company, said: "We believe that this is a great initiative from Seafish since it will help improve understanding of how certification standards can contribute to on-going improvement in the industry. It is also useful to be able to find information on all the different schemes in one place."

The Seafish Guide to Seafood Standards is available at: www.seafish.org/standards

30 May 2013

ASC seeks feed standard

THE Aquaculture Stewardship Council (ASC) has launched a project which aims to develop a Feed Standard. In order to formulate this benchmark, the council has invited experts from the feed industry to join a working group and actively contribute. The project is starting shortly and a new globally applicable ASC Feed Standard should be ready by the end of 2015.

The standard will set out requirements and introduce consistency for the aquaculture feed industry to operate on a more environmentally sound and socially responsible basis. It aims to allow manufacturers who have demonstrated their environmentally responsible production practices to gain recognition for their efforts. For now, feed plants cannot be ASC certified. However, some are already becoming more responsible – such as the BioMar factory in Brande, Denmark, which has put in place systems to comply with the ASC Standards for salmon and trout.

ASC is encouraging interested stakeholders from all areas of the industry (aquaculture feed producers, raw material suppliers, fish farmers, academic community, NGOs etc) to become actively involved with the project. For further information, please contact Michiel Fransen. Information on the initiative can be found on the ASC website. Pilot tests of the Feed Standard are expected to start in the second half of 2014.

20 June 2013

Announcements

Pivotal moment for red tape review

According to Richie Flynn, IFA Aquaculture Executive, the European Commission's drafting of new multi-annual plans for the development of aquaculture is a "defining moment" for the sector – as it provides a chance to cut through the red tape that he believes is restricting the growth of the industry in Ireland. The claim was made while speaking to over 100 national government, European Commission and parliamentary delegates at the annual "Aquaculture in Motion" event in Brussels on November 6.

"As a net importer of over 75% of the seafood we consume, the plans agreed in the coming months between member states and the Commission, following the reform of the Common Fisheries Policy, will reveal the real level of commitment by politicians and officials to address in the EU seafood deficit and support coastal and peripheral communities," he announced.

Under the new financial plan for seafood, each member state is obliged to produce national strategic plans for the development of their trout, salmon shellfish and freshwater farming sectors. The €6 billion European aquaculture sector is perfectly placed in terms of meeting the burgeoning demand for healthy seafood products, being well regulated, having the collective experience and quality production skills to supply a significantly increased part of EU consumption, according to Flynn.

He continued by saying: "Each national government must now set out the actions they intend to take to speed up and simplify licencing of fish farms, reduce red tape, enhance EU producers' competitiveness and level the playing pitch with imports." Should they fail to be realistic and committed to those plans then they are obliged right now to explain why they surrendered this opportunity to communities, families and customers and to immediately invite third country imports from Asia, Russia and Norway to take control the whole EU market."

"Stagnation in EU production of farmed fish over the last decade has been the result of years of inertia, difficulties with competing and confusing EU legislation and a lack of respect for the needs and ability of small companies to absorb the costs and impacts of multi layered bureaucracy and red tape."

Aquaculture in Motion heard case studies from France, Hungary, Spain and Germany on the development of their multi-annual plans and a review of the European Maritime and Fisheries Fund agreed last week by the European parliament Fisheries Committee.

In summing up the views of producers around Europe on behalf of the Federation of European Aquaculture Producers (FEAP), Mr Flynn said that plans without action were of no use to the sector, its workers, investors or customers and that the winners from the new EU policy would be those countries with auditable performance indicators to reduce production costs and increase economies of scale.

07 November 2013

Scots firms collaborate on Falklands trout farm

The collaborative expertise from two leading Scottish aquaculture companies has led to the successful completion of a brown trout farm in the Falkland Islands.

Fusion Marine supplied two fish farm pens in kit form for the pilot brown trout venture operated by Falklands based fishing company Fortuna, with Kames Fish Farming providing a wide range of ancillary equipment, as well as project managing the overall installation. Fusion Marine and Kames, who are both based in Argyll in Scotland, have worked together on a range of collaborative projects around the world for the last 20 years.

This small-scale pilot project by Fortuna aims to assess the potential of breeding and growing brown trout (*Salmo trutta*) in sea pens in the Falklands. Brown trout were introduced into the islands by settlers in the 1940s and now thrive in its natural water courses.

Running the project for Fortuna is Simon Hardcastle who worked at Kames in Scotland in the early 1980s, and who has previously also led a trial farming operation in the Falklands with salmon and mussels. Simon has set up a small recirculation hatchery utilising eggs sourced from wild-caught fish and has managed to produce 15,000 high quality brown trout smolts, which have now been transferred to the two Fusion Marine Aquaflex pens located in Fitzroy Sound, south west of Port Stanley.

These 50m two-ring pens were supplied with full safety decking, sinker tubes, nets and a mooring system. Kames also supplied a wide range of associated ancillary equipment for the fish farm, including transport tanks, crowding ring, handling nets, navigation lights and mounting system, as well as solar-powered automatic feeders. The farm will be serviced by a Hornet workboat, which was supplied by Fusion Marine's Chilean based sister company, Oban SA. If the trial goes

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well, then it is anticipated that the fish farm will expand further at some stage in the future.

Peter Richardson of Kames Fish Farming said: "Simon Hardcastle stocked the first consignment of smolts recently and they are doing well. His main challenge will be from predators since there are a lot of sea lions on the island. This is the principal reason behind fitting sinker tubes to the nets as it allows them to be kept very much tighter, thus helping prevent seal damage. There are no other fish farms on the island, so the environment is clear of any fish diseases or parasites, which represents a big advantage.

"Long term the idea is to export the produce aiming at very high end market outlets since this would be a premium product with the Falkland Islands brand name and most likely smoked and packed on the islands. This initial trial batch of fish will probably be sold on the island to service the growing tourist industry now found there."

Stephen Divers, managing director of Fusion Marine said: "We have forged a very close working relationship with Kames and there is over 60 years of combined experience in the aquaculture industry between the two companies. By utilising this expertise and drawing upon our particular strengths, we have over the years successfully completed a number of fish farm installations, often for pilot projects similar to this one in the Falklands. This collaborative approach provides an all-encompassing service from the supply of fish farm pens and essential ancillary equipment, right through to installation and full project management and after sales support."

20 November 2013

UK producers join renewables initiative

A new three year international research project will see the agriculture, biogas and aquaculture sectors, including input from the Scottish Salmon Producers' Organisation and the British Trout Association, working together to develop renewable energy.

The project team known as "BiFFiO" will look at new ways to increase industry sustainability by managing by-products more effectively. BiFFiO will investigate how waste can be used to create renewable energy, and examine what nutrients can be recovered for other uses. A key objective is to shrink the current state-of-the-art technologies to farm-scale so that efficient and economical biogas energy can be produced locally on or near a farm site. Over the next three years, the project team plan to address the challenges faced by industry by looking at new ways to meet regulatory requirements, and to develop best practice for by-products.

29 November 2013

Joint statement on requirements for the responsible sourcing of fishmeal and fish oil

Issued by ASC, GAA and GLOBALG.A.P.

A Memorandum of Understanding was signed on 23rd April 2013 by the three standard setting organizations that identified a number of topics where collaborative action would create efficiencies and promote the uptake of our respective programs.

An early priority identified was to review how the standards address the sourcing of fishmeal and fish oil (FMFO). These raw materials are important to the production of feed used for the farming of fish, crustaceans, pigs and poultry. Unfortunately, when sourced from fisheries that do not follow responsible management practices significant negative environmental impacts occur.

The following chart summarizes the current FMFO sourcing requirements of the three parties. It identifies the crosscutting elements that are covered in all 3 programs and from which feed manufacturers can choose to expand in order to meet one or more of these programs.

The identified common criteria are:

- Traceability to the species and, at least, to the country of origin.
- No use of material sourced from endangered species based on IUCN´s red list.
- Avoidance of fish sourced from illegal, unreported and unregulated fishing (IUU).
- Preference for feed manufacturers with publicly available evidence of responsible sourcing, such as third-party certified sourcing of FMFO derived from fisheries and aquaculture, including FMFO derived from fish by-products.

Regardless of the certification program chosen and implemented, the aqua feed and livestock feed sector should apply the above common criteria as a minimum set of requirements when sourcing FMFO ingredients. This will better promote the responsible sourcing of FMFO, for the benefit of the environment and the future sustainability of the fisheries and other FMFO-sources utilized by the aqua feed and livestock feed sectors.

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Glossary of terms used in this document

ASC: Aquaculture Stewardship Council (www.asc-aqua.org)

BAP: Best Aquaculture Practices Program (www.gaalliance.org)

CITES: CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. (www.cites.org)

Endangered species (IUCN red list): Endangered (EN) and Critically Endangered (CR) species refers to plants and animals assessed for the IUCN Red List of Threatened Species™ which provides taxonomic, conservation status and distribution information. The system is designed to determine the relative risk of extinction and to catalogue and highlight those plants and animals that are facing a higher risk of global extinction.

FAO: Food and Agriculture Organization of the United Nations (www.fao.org/)

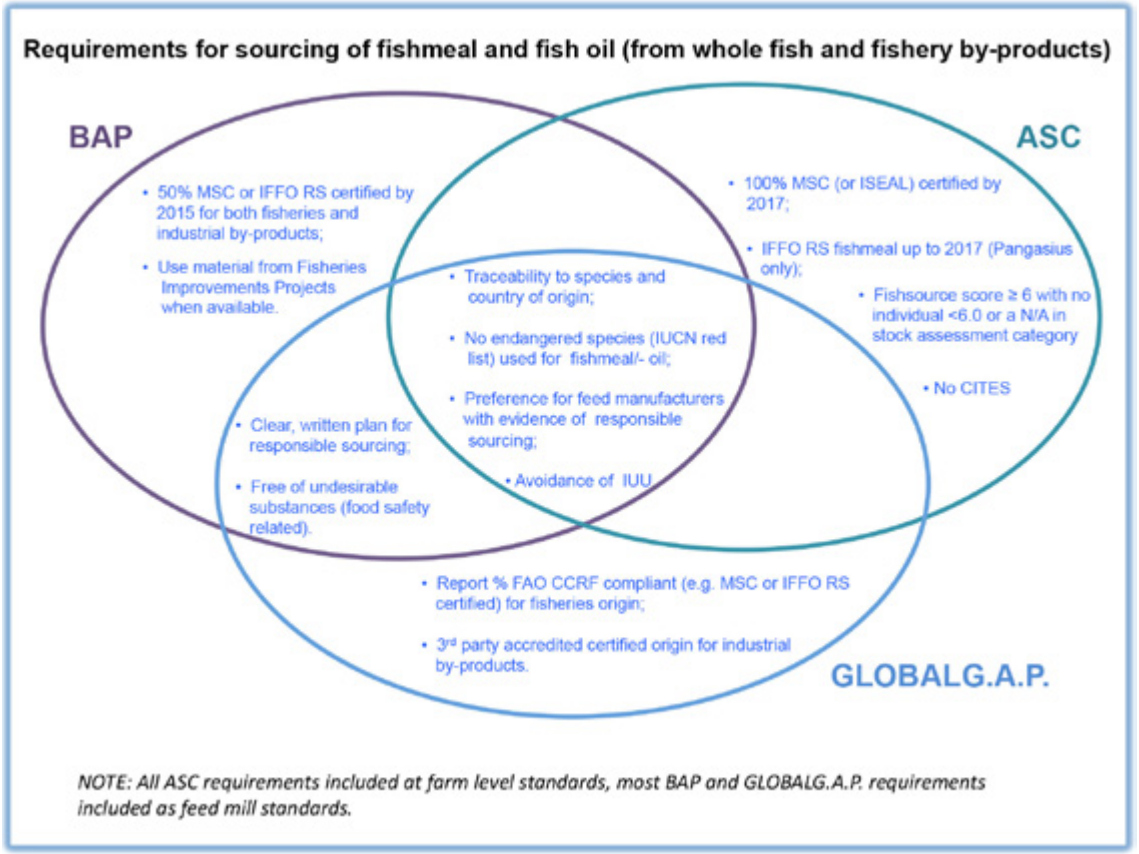
FAO CCRF: Code of Conduct for Responsible Fisheries of FAO (www.fao.org/fishery/code/en)

Fishsource: FishSource™ is a resource about the status of fish stocks and fisheries. Its aim is to provide major seafood buyers with up-to-date, impartial, actionable information on the sustainability of fisheries and the improvements these need to make to become sustainable. (www.fishsource.org)

FMFO: Fish Meal and Fish Oil

GAA: Global Aquaculture Alliance (www.gaalliance.

Promoting and assuring more sustainable and responsible practices for the benefit of aquaculture stakeholders and society at large



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org)

GLOBALG.A.P.: Global standard for safe and responsible agricultural practice worldwide (www.globalgap.org)

IFFO: International Fishmeal and Fish Oil Organization (www.iffo.net)

IFFO RS: IFFO Global Standard for Responsible Supply

IUCN : International Union for Conservation of Nature (www.iucn.org; URL to Redlist: www.iucnredlist.org)

IUU: Illegal, unreported, unregulated (IUU) fishing

ISEAL Alliance : Non-governmental organization whose mission is to strengthen sustainability standards systems for the benefit of people and the environment (www.isealalliance.org)

MSC: Marine Stewardship Council (www.msc.org)

Press cuttings

We have IDREEM

A NEW four-year European research project, called IDREEM (Increasing Industrial Resource Efficiency in European Mariculture), has been launched to help to develop Integrated Multi-Trophic Aquaculture (IMTA) on a commercial scale.

The €5.7 million project, which started in October, is coordinated by the Scottish Association for Marine Science (SAMS) and delivered in collaboration with fourteen industrial and research partners from across Europe.

In an IMTA system, fish are farmed together with other species including shellfish (such as mussels) and algae or seaweed, creating a more efficient, cleaner and less wasteful production system. IMTA allows nutrients from fish farms that are otherwise lost to the environment to be turned into useful products, as they are utilised by these additionally grown species.

IMTA addresses concerns about the future sustainability of aquaculture by increasing productivity and profitability while also reducing waste and over-reliance on raw materials from wild fish stocks.

The IDREEM project will demonstrate the benefits of IMTA through pilot commercial-scale testing, field research and modelling. Interdisciplinary research within IDREEM will examine the obstacles and risks to the use of IMTA systems and develop tools to overcome these constraints, whether they are economic, environmental, technical, social or regulatory.

Partnerships

IDREEM pairs aquaculture businesses and research institutions in strategic partnerships to promote rapid implementation, allowing instant transfer between research findings and commercial applications. The tools and methods developed within IDREEM will help aquaculture enterprises and policy makers gain a better understanding of the risks and benefits associated with IMTA.

The end result of the project will be the creation of a more efficient European aquaculture industry, based on the development of more economically and environmentally efficient technology. IDREEM will deliver tools and evidence to support the adoption of IMTA across the aquaculture industry, helping create employment and widening a market niche for IMTA-grown seafood products.

Fish Farmer - November/December 2012

A fresh look at feed

SKRETTING is using X-rays and nuclear magnetic resonance imaging (NMR/MRI) to examine pore size and pellet structure and the ways in which minor ingredients can affect them.

Jan Jonkers, Feed Production Manager at Skretting ARC in Stavanger, says: "While a Skretting feed will have consistent nutritional properties, the raw materials may vary from batch to batch, which affects the way the feed behaves in the production plant. Increasingly Skretting is delivering feed from silo to silo, rather than in big bags. Transferring feed from the silo on the boat to a silo at the farms involves blowing it along pipes or using elevators and conveyors. Either way brings additional physical impacts on the pellets and we need to make them tougher. That is a challenge with feeds such as salmon grower feeds. The high contents of fats and proteins leave little space for the binding ingredients that hold the pellets together."

Fish Farmer - July/August 2012

CANADIAN COMPANY LOOKING TO USE PROBIOTICS IN ALL FISH SPECIES

Canada-based Lallemand Animal Nutrition recently announced that Bactocell, their first probiotic to be approved by the European Union for salmonoid and shrimp aquaculture, has now received a thumbs-up for use in all fish species by the European Food Safety Authority's (EFSA) Panel on Additives and Products or Substances used in Animal Feed (FEEDAP).

"This achievement is an important milestone for the development and successful application of natural and sustainable concept to aquaculture in Europe," Lallemand said.

The "positive opinion" was obtained after conduction additional trials and analyzing them to find that they showed "reduced deformities and improvement in mineralization in fish."

"Taking the data on seabass and salmonoids together, Bactocell has the potential to reduce bone deformation in developing fish," the panel concluded.

According to Lallemand, fish bone deformation represents "a major challenge" for the aquaculture industry, particularly marine fish hatcheries, with grave financial consequences in the Mediterranean region.

The latest positive opinion for the use of Bactocell in complete feed for aquatic species is EFSA's third; the first two resulted in its authorization for salmonoids and shrimp.

"Obviously the three EFSA 'positive opinions' are attributable to the high quality and level of scientific documentation resulting from long-term research and development and collaborations with academic and industrial partners," Lallemand Scientific Director Henri Durand said.

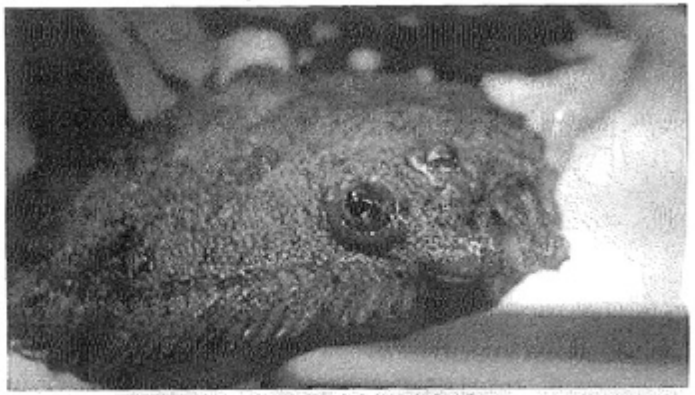
Lallemand Inc is a privately owned Canadian company specializing in yeast, bacteria and yeast derivatives for animal nutrition, baking and the pharmaceutical industries. It's a major supplier of probiotics around the globe.

Fish Farming International - October 2012

Less fishmeal for new species

After reducing fishmeal feed for salmon, trout, bass and bream – Skretting introduces turbot and yellowtail

IntraFish.com



TURBOT: Skretting's MicroBalance concept is now working for turbot and yellowtail

Skretting Spain introduced Optiturbot, a turbot diet that allows for good performance with 40 percent less fishmeal.

"The trials over a full year showed exactly the same specific growth rate and feed conversion ratios as the conventional turbot diet," said Skretting Spain Commercial Director Fernando Sanz. "Because Optiturbot is less dependent on fishmeal, with its current high cost, it is proving attractive to customers. The performance of the diet demonstrates that the MicroBalance concept, developed at Skretting Aquaculture Research Centre (ARC), can be applied widely."

The concept was first introduced two years ago for salmon feed and has since been extended to trout, sea bream and sea bass – and now turbot and yellowtail. The MicroBalance idea is based on Skretting findings that fishmeal provides a number of micro-ingredients that can be sourced from alternative raw materials.

Skretting Japan found similar success for yellowtail, too. "Skretting Japan successfully transferred the knowledge we gained with several other species to reduce fishmeal levels in yellowtail diets from over 60 percent to around 30 percent," Skretting ARC's Leo Nankervis said. "In trials we have seen good performance in yellowtail with 25 percent fishmeal, so we know that 30 percent is a safe level for commercial diets."

Nankervis said the next goal is using the concept in shrimp feed.

Fish Farming International - October 2012

About this publication

Finfish News is published twice yearly as a service to the British finfish farming industry. It is produced and edited by the Centre for Environment, Fisheries and Aquaculture Science (Cefas) on behalf of the Department for Environment, Food and Rural Affairs (Defra)

Contributing to this publication

Articles, news and comments relating to finfish farming are welcomed from all stakeholders, including government, NGOs, industry and researchers.

All contributions should be sent to the editor by email.

The views expressed in this issue are those of the contributors and are not necessarily those of the editors, Cefas or Defra; and the reference to proprietary products should not be construed as an official endorsement of these products. The editors reserve the right to edit articles or other contributions.

Feedback

The editors welcome feedback on the content, format and presentation at any time.

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Contact information

Cefas is an Executive Agency of Defra. For more information please visit www.cefas.defra.gov.uk.

Editors:
Tim Ellis
Telephone: 01305 206706
Email: tim.ellis@cefas.co.uk

David Smith
Telephone: 01305 206741
Email: david.smith@cefas.co.uk

Address for correspondence:
Cefas
Barrack Road, The Nothe
Weymouth
Dorset
DT4 8UB

Copyright information

Where to get help and advice

The following organisations and websites provide useful information to help your business or research

Policy and administration

Defra (Department for Environment, Food and Rural Affairs) - www.defra.gov.uk.

Specialist areas within Defra:
- Fish farming policy: Sustainable Fisheries.
- Finfish health: Aquatic Animal Health Unit - fishhealth@defra.gsi.gov.uk
- Research: Science Directorate - research.competitions@defra.gsi.gov.uk - or relevant department.

Grant Aid: Marine Management Organisation - www.marinemanagement.org.uk.

Welsh Assembly Government - www.wales.gov.uk.

Scottish Executive Environment and Rural Affairs - www.scotland.gov.uk.

Department of Agriculture and Rural Development for Northern Ireland - www.dardni.gov.uk.

Scientific and technical advice

Fish Health Inspectorate, Cefas - www.defra.gov.uk/aahm. For health regulations and disease control in England and Wales. The website also provides forms, books, and guidance for imports, exports, diseases and non-native species.

Defra - www.defra.gov.uk. Farm animal welfare.

Environment Agency - www.environment-agency.gov.uk. For environmental issues.

Food Standards Agency - www.food.gov.uk. For food hygiene and human consumption.

Veterinary Medicines Directorate - www.vmd.gov.uk. For veterinary medicines.

Marine Scotland Science- www.marlab.ac.uk. For health regulations and disease control in Scotland.

Wildlife conservation:
- JNCC - www.jncc.gov.uk.
- Natural England - www.naturalengland.org.uk.
- CCW - www.ccw.gov.uk.

Crimestoppers

A new cross government and industry partnership with Crimestoppers means you can now leave information completely anonymously about aquatic crimes. Call 0800 555 111 or visit www.crimestoppers-uk.org.

Trade bodies and associations

British Trout Association - www.britishtrout.co.uk.

Coarse Fish Traders Association - ian@blueroof.co.uk

Ornamental Aquatic Trade Association - www.ornamentalfish.org.

British Aquaponic Association - www.baqua.org.uk

Angling Trust - www.anglingtrust.net.

Seafish - www.seafish.org.

Humane Slaughter Association - www.hsa.org.uk.