



IFFO

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UPDATE

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This is my first chance to thank all the delegates who attended the IFFO Annual Conference in Bangkok at the end of October. The presentation

impact of meeting various voluntary standards continues to increase and the panel soon used up the time allocated in discussing the future in this area. Unfortunately, the world and language of certification is sometimes hard to understand but IFFO are active in representing members in this area and can help with any questions you may have. We have had some great feedback about the interactive nature of the panel session, and this is a format we will be looking to include more often in the future. As usual, all presentations from the conference are available to delegates on the IFFO website.

The Peruvian B season is now well under way, with some not unexpected mini bans resulting from juvenile percentages demonstrating that the Peruvian Anchoveta fishery is one of the best managed in the world. In the next 12 months, we should see more results from research sponsored by IFFO into how this sort of small pelagic stock interacts with other parts of the ecosystem, contributing to further improvements in stock management, not just for Anchoveta but also Menhaden, Sandeel and other forage or low trophic level species.

slides with audio are now available on both on [IFFO website](#) and [IFFO events website](#), you will need to login to access them. The combination of our usual high quality conference programme and an outstanding hotel made it one of the best received and most talked about conferences in recent years. We always need to look at ways of improving so I hope, if you attended, that you have had a chance to complete the Conference Survey to tell us about your experience. If not, drop us a line anytime to let us know if there is something you think we could change to make the event even better.

One of the main features of the conference was a panel discussion on certification. Although certification has been with us for some time now, the

The partnership with the University of Washington is an example of the collaboration IFFO has with academic groups to provide IFFO members and policy makers with science based evidence to help make decisions. The Board of IFFO approved in Bangkok a range of further projects for investment in science in 2017 and we are always open to ideas from our members on what scientific questions you would like to see answered. We are here to help and support the future development of the industry.

Finally, with the festive season now upon us, I would like to wish all our members and families a very happy Christmas holiday.

Andrew Mallison
Director General

New IFFO applicant members (awaiting Board approval in April)

Country	Company	Category
Denmark	NC	Non-Producer
U.A.E.	Uniglobe General Trading L.L.C.	Non-Producer

IFFO RS Standard ends another successful year of growth and further developments planned for 2017



The IFFO RS Standard has continued to expand its reach, with 118 certified marine ingredients producing factories located in 16 countries. Morocco is the latest country to join the programme, strengthening presence in Africa. By the end of 2016, the programme will represent almost 45% of the total world output of fishmeal and fish oil, produced from both whole fish and by-products (heads, guts, frames) from the human consumption market. As well as this success, the IFFO RS Certification Programme is also recognised as a credible standard for responsible sourcing and production of marine ingredients by the major aquaculture standards such as GAA Best Aquaculture Practices (BAP) and the Aquaculture

Stewardship Council (ASC). It is expected that the production of compliant certified IFFO RS material will continue to increase over the years, and the development of the new version 2.0 of the IFFO RS standard should help with this expected increase.

To ensure the Standard remains ahead of the curb, the IFFO RS Governance Board (GB) decided at the last meeting to carry out a full strategy review during the course of 2017, involving a wide-ranging consultation of stakeholders, including industry and NGO's. The purpose of this review is to agree a strategy for the Standard going forward to 2025. The IFFO RS GB has also decided to continue with the implementation of all the ISEAL codes into the IFFO RS Certification Programme, but has decided to put the membership application process on standby as the final application will depend on the outcome of the proposed strategic review.

The development of the IFFO RS V2.0

Standard has been carried out in two parts. The revised fishery criteria and proposed new assessment methodology (excluding mixed trawl fishery criteria) were opened up for a 30 day public consultation in August 2016. The factory audit criteria are under development and the aim is for the first full draft of the Standard (excluding mixed trawl fishery criteria) to be ready and opened for a 60-day public consultation period from January 2017. The intention is to have this new version ready to be launched in June/July 2017, with a period of implementation of approximately 12 months for existing IFFO RS certificate holders. The mixed trawl fishery section of the fisheries assessment will be included in the new version by the end of 2017.

The 60-day public consultation period will start on the 16th January 2017 and run until 17th March 2017. All the necessary information and templates to use for the consultation will be available on the IFFO RS [website](#).

Marine ingredients as a foundation for global fed aquaculture production



Article submitted to the International Aquafeed Magazine in November, upon request by journal.

Fed aquaculture developed in the 1960s at a time when the global supply of fishmeal and fish oil had previously been directed towards terrestrial protein production systems, and direct human

consumption (e.g. hydrogenated fish oils), as well as other uses such as crop fertilizer (fishmeal), leather dressing and lighting (fish oil). That destination for global annual fishmeal and fish oil supply has since changed, associated with the growth

of aquaculture from the late 1960s onwards.

This has resulted in aquaculture taking an increasing share of both ingredients over that period, to the point where approximately 70% of fishmeal and 73% of fish oil was directed to aquaculture in 2015 (IFFO estimates). With a "normal"

year's annual production of fishmeal and fish oil around or slightly below 5 million tonnes and 1 million tonnes respectively, the marine ingredients industry is small in comparison to other animal feed ingredients such as soya and wheat.

It is, nonetheless, very important in relation to the nutritional qualities that it provides to farmed fish and crustacean species, and remains the base of fed aquaculture to this day. It is also the basis for global pig and poultry production systems, but here our focus is on aquaculture.

Despite the current fad for headlines and articles that criticize the inclusion of marine ingredients in aquafeed, it is

important to remember that fishmeal and fish oil are the nutritional foundations upon which the modern aquaculture industry is based.

Without the nutritional quality of these ingredients in facilitating the development of fed aquaculture, the reality is that there just wouldn't be a global aquaculture industry that supports a large and growing proportion of consumed seafood.

Fishmeal is nutritionally complete for carnivorous species (although fishmeal itself may not be required) and it is a cost effective package providing the range of macro and micronutrients required by farmed aquatic animals (Tacon & Metian, 2008).

For species such as salmon, trout, bass, turbot especially aquafeeds were dominated by these materials in the early days of fed species production, permitting the growth of an important industry. Having a complete nutrition available for the fish allowed efforts on technological development to address issues of production systems design and engineering, physiology, genetics, reproduction and the supply of gametes, and disease control to advance.

With finite annual supplies of fishmeal and fish oil available, however, there would come a time when marine ingredient inclusions in aquafeeds would decrease as they were substituted by other ingredients, optimizing the use of aquatic proteins and oils, and thereby facilitating the continued growth of aquaculture.

The overall volume used in aquaculture didn't reduce, but the inclusion level in feeds did, permitting a feed volume increase that supplied a growing market. The "Fishmeal Trap" that had been highlighted by some authors in the early 2000s as limiting for aquaculture growth was not realized though, as partial substitution of the marine ingredients, notably with ingredients from vegetable sources but also including other animal proteins in some regions occurred (Jackson, 2012).

It has also been noted that fishmeal has

become more of a strategic ingredient, reflecting a move away from being a commodity in aquafeeds previously (Ibid.).

Why fish-free is not the reality

It is noticeable through 2016 that there are consistent messages in the media about "fish-free" feeds for aquaculture, including in some instances prizes for attaining this goal in commercial volumes, on the basis that this will somehow improve the (aquaculture) industry's sustainability.

Also, some of the major feed companies have provided press releases in recent months emphasizing that they are able to manufacture fish-free aquafeeds suitable for farming carnivorous species (but in some instances also stating that they will not be doing this even though the technology is available). In academia it seems that it is now trendy to work on the subject and there are similar examples e.g. Sarker et al., 2016, describing the apparent benefits of "complete substitution" of marine ingredients.

It has become fashionable to take this stance, even though a major proportion of the marine ingredients that are produced globally originate from raw material derived from well managed fisheries, or increasingly from byproduct from the seafood processing industry, so the viewpoint that the substitution of marine ingredients is somehow addressing sustainability issues in fishmeal and fish oil supply is largely unsubstantiated.

Clearly, some parties have vested interests in such statements, as well as having something to gain from those positions, but the reality is that fishmeal and fish oil remain very much part of global aquaculture. The nutritional profile of these marine ingredients is just too valuable to lose.

It seems that at least some of the problem is a misinterpretation of the message that annual marine ingredient supply is finite (which implies partial substitution to achieve consistent growth in volumes), to now become a

message about replacement, which is altogether different.

An overview of salmon feed ingredients covering 1990 to 2013 (Ytrestøyl, Aas, & Åsgård, 2015) showed a decrease from 90% (c.66% fishmeal and 24% fish oil) marine ingredients to c.30% (18% fishmeal, 11% fish oil), illustrating how this has worked in commercial reality. The macronutrients in fishmeal are important for aquaculture, and the digestibility of fishmeal as an ingredient is very high compared with most other animal feed ingredients.

Increasingly the micronutrients, especially the nutritional advantages to be gained through polyunsaturated fatty acids, the amino acid profile, and the vitamin and mineral profile, are becoming recognized not least for the health benefits for the farmed animal as well as the more obvious benefits around growth performance.

At the current time, and in practical terms, other feed ingredients do not carry the broader nutritional advantages of marine ingredients. This may change with the advent of some of the new technologies available for producing e.g. proteins from methane, or oil containing omega-3 fatty acids from terrestrial plants, but the question will always be about the volume of supply that can be achieved relative to the demands of an aquaculture industry that continues to grow steadily at close to the rate of 5.8% per annum seen over 2005-2014 ((FAO) Food and Agriculture Organisation, 2016).

Predicting raw material supply

Securing the continued supply of raw materials for fishmeal and fish oil production is high on IFFO's agenda, and an IFFO sponsored project at the Institute of Aquaculture, University of Stirling, U.K., investigated how this may change from the current position over the next 10-year period.

Estimates were calculated, based on FAO and IFFO data, for the present position, as well as predictions for 5 years' and 10 years' time. Currently around 20 million tonnes of raw



material across the world are used for fishmeal and fish oil production annually. Of this total, 14 million tonnes derives from whole fish from reduction fisheries, of which nearly 50% comes from South America.

By-product contributes 5.6 million tonnes (3.7 million tonnes from capture fisheries and 1.9 million tonnes from aquaculture) equivalent to about 28% of the total raw material supply. Europe is a major contributor to capture fisheries by-product (1.2 million tonnes) and Asia to aquaculture by-product (0.8 million tonnes).

Over the next 10 years, fishmeal production is estimated to grow by 25-30% mainly as a result of increased raw material availability, mostly from processed seafood byproduct. For various reasons, many of which are logistical and relate to the collection and transport of the raw material to fishmeal plants, byproduct utilization in fishmeal and fish oil production has some scope for improvement.

Yields in fishmeal and fish oil from byproduct differ in comparison to whole fish. Fish oil production is predicted to increase to a lower level (5-10%) over that period as a consequence of increasing proportion of by-products from whitefish fisheries for example, and increasing contributions from freshwater aquaculture species that are often lower in oil content.

The most pressing restriction of marine ingredients from the perspective of aquaculture development relates to fish oil availability, and the supply of the omega-3 fatty acids eicosapentaenoic

acid (EPA) and docosahexaenoic acid (DHA).

With these compounds there is a very real need for increasing volume of supply. Both fats are essential for the health of farmed salmon, and importantly are retained in the flesh of farmed salmon and provide health

benefits to humans.

A global finite supply, including in very recent times an additional impact of El Nino events in South America, has impacted the availability of these compounds. The project team calculated that approximately 210,000 tonnes of EPA and DHA is supplied annually from global sources, with South America the major contributor to this total.

Hypothetically, if all the available byproduct was processed there could be an additional 170,000 tonnes of EPA and DHA available. Taking into account how wild-caught supply and aquaculture production would change over the period of the next ten years, the team predicted that this could rise to an additional 200,000 tonnes in 2025, assuming that all available byproduct could be collected.

There is at least some scope for increasing supply in the future, albeit with some practical concerns around availability and collection of byproduct raw material. This is an important point because we are likely some way off the commercial reality of alternative sources of EPA and DHA in the necessary volumes, and it is only through working together across all ingredients supply that the demands of the growing aquaculture industry can be met.

Sustainable supply and certification

It is interesting to note the perceptions about sustainability in the marine ingredients industry, particularly from the perspective of a comparison with other feed and food materials. From

2009 onwards, IFFO worked on the development of an independent third party certification scheme for marine ingredients, together with the support of the industry, retailers and NGOs, which was adopted by the industry in 2011.

Five years on, the IFFO Responsible Supply (IFFO RS) scheme is working through version 2.0, which should be adopted in late 2017. In 2015, the IFFO RS programme represented over 40% of global supply of fishmeal and fish oil, something in the region of 2.2 million tonnes of supply of fishmeal. The predictions for the growth of certified material supplied from the industry are for approximately 47% of global production by the end of 2017, with plans to increase this further through the adoption of several Improvers Programmes in different countries around the globe.

When this figure, as an overall global production of compliant material, is viewed in comparison with other feed ingredients used in aquafeeds, marine ingredients are very well represented with a percentage of global certified supply well in excess of the figures for ingredients such as, for example, soya and wheat.

Summary

Marine ingredients have played a crucial role in the development of fed aquaculture systems, and will continue to do so in the future.

Aquaculture's need is for continuing growth in feed volume, along with the ability to meet the nutritional and end product quality requirements of farmed aquatic species. Despite a critical representation of marine ingredients in the media, it is clear that the volume of supply required will be driven through a situation where fishmeal and fish oil are important components within the available basket of ingredients, in an "as well as" rather than an "instead of" approach.

Dr Neil Auchterlonie, Technical Director, IFFO

UN-TDG meeting Geneva 29th November 2016



Dr Gretel Bescoby participated in the recent United Nations 50th Session of the Committee of Experts on the Transport of

Dangerous Goods (UN-TDG) meeting held in Geneva from 28 November to 6 December. The Committee, working on behalf of the UN, has a role in achieving consistency with the many different country regulations related to the transport of dangerous goods through the Recommendations on the Transport of Dangerous Goods, Model Regulations, (now in its nineteenth revised edition). Proposal review and adoption is an important step in achieving change to the wording for fishmeal stabilisation in shipping, specifically in relation to the permitted antioxidants (and their level).

In developing the case, IFFO had submitted a paper that provided the results of the 12-month fishmeal stability trial which supports the reduced dosage level of 300 ppm ethoxyquin, as well as the use of BHT and tocopherols. The favourable results of the trial demonstrated that fishmeal could be shipped safely with the

requested antioxidants and the levels used. IFFO proposed that the residual levels of ethoxyquin should be reduced from the current 100 ppm to 50 ppm at the time of shipping as well as the inclusion of BHT and tocopherols into the UN-TDG Model Regulations as alternative antioxidants for the stabilisation of fishmeal. The reduction in ethoxyquin inclusion level was proposed on the basis that the breakdown products provides additional antioxidant activity as well as the fact that fishmeal dosed with 50ppm ethoxyquin successfully passed the self-heating test after 12-months storage.

The results and request for change to the text of the UN-TDG Model Regulations were shared with the Committee. The Committee thanked IFFO for the work done and appreciated the extent of the research done to support the requested changes. After discussions between member states and additional questions, the proposed changes to the text was voted on and all were in favour of accepting the proposed changes to the Model Regulations. The amended text for Special Provision 308 that will be written into Revision 20 of the Model Regulations will state that fish meal shall contain at least 50 ppm (mg/kg) of ethoxyquin, 100 ppm (mg/kg) of BHT or

250 ppm (mg/kg) of tocopherol based antioxidant at the time of consignment. This helps to provide the opportunity to reduce the level of ethoxyquin in fishmeal at a time when it is under a great deal of public scrutiny. It also helps provide another option for fishmeal stabilisation to producers, with the addition of tocopherols as a named antioxidant, thus reducing the vulnerability associated with having only two named antioxidants (both of which are within the reauthorisation process in the EU).

The next step in the process to change the shipping rules for fishmeal will be to present the data and proposed text to the IMO Editorial and Technical meeting to be held in May 2017 as well as the IMO Sub-Committee on Carriage of Cargoes and Containers (CCC) to be held in September 2017. At that meeting it will be decided whether the same text will be adopted into the IMO codes.

This is something of a success for IFFO, but there remains much more to be done, and we continue to place a lot of importance on this issue. Pragmatic changes to the shipping rules for fishmeal remain a high priority for IFFO and we will update members with any developments on the process once available.

IFFO UN-TDG Documents are [here](#).

China: IFFO report from Summit of Value-added Application Innovation of Aquatic Resources

IFFO China Director Maggie Xu and China Technical Specialist Jing Zhang attended the Summit of Value-added Application Innovation of Aquatic Resources organized by China Aquatic Products Processing and Marketing Association (CAPPMA) in Beijing on 21st-22nd November 2016.

The 1.5-day conference covered value-

added application of aquatic resources with special focus on active peptide, active sugar and active lipid. Around 200 delegates attended the summit, including Chinese enterprises and academic institutions. The summit included two plenary sessions, two technical sessions and a panel discussion. The speakers and panellists exchanged information in regulation, R

& D and market situations.

According to a Director of Ministry of Agriculture (MOA), China's total aquatic output last year was 67 million tons, which included 49 million tons of farmed products and 18 million tons of wild products. China produces over 60% of global aquaculture output while the wild harvest accounts for one third of



worldwide production volume. Around 23 million tons of aquatic products were processed in China last year. Two thirds of the final products were frozen and the proportion of higher value-added products was small. Fishery by-products value-added processing is important to avoid waste or pollution. Overall aquatic products processing rate was 34% in 2015. The processing rates of marine products and fresh water products was respectively 50% and 17%. Among China overall fishery economy, primary harvesting/farming accounts for 51%, industrial processing takes a share of 23% while relevant service contributes 26%. Fishery sector in China suffers a low comparative effectiveness and limitations from resources and environment. Other challenges include costs from labour and land usage, etc. It is the goal of China's aquatic sector to supply higher value-added products that

are convenient to use and with health benefit functions. MOA calls for progress in terms of intensive processing of freshwater aquatic products.

The Assistant Professor of Clinical Pharmacy of the University of Southern California (USC), Benson Kuo, gave a presentation on Supervision on Marine Functional Foods and Medicines by Food and Drug Administration (FDA) of the US. His PPT file (in English) is available at request.

According to a research by the Food Engineering and Nutrition Department of the Yellow Sea Research Institute, among the Chinese consumers undertook the survey, 23% knew health food products well, 15% had no idea what health food is while 62% had some sort of knowledge but did not have confidence in choice making. 73% of the health food market share in China is taken by plant-based products. Homogeneity, lack of high & new technology and inadequate regulation system are the main challenges faced by the industry currently.

The Director General of the China Public Nutrition Development Center (CPNDC), Mr. Xiaodong Yu, introduced in great details China's overall health industry concept. All government departments were requested to include public health element into policies. The government's target is to raise average life span of Chinese from the current 76 to 79. The task is challenging given the deteriorating soil fertility, wide spread pollution of water, air and soil as well as the invisible starvation. According to the national nutrition survey conducted once every 10 years, the problem of micro-nutrients deficiency among Chinese is more and more serious, especially for brain cell growth.

A Chinese producer introduced China's collagen peptide market in her presentation. Fish is the biggest source of raw material for collagen peptide while skin nutrition is the biggest market. Internationally Asia, UK and Brazil are the leading markets. Between 2014 and 2015, China market grew by 40% annually to reach the value of CNY 10 million, according to some estimation.

One of the panellists, who is the Chairman of a local marine-based health food company, shared the top three considerations of his enterprise: science & high-technology as a protection, product effectiveness to retain customer, and appropriate market price setting.



China: Workshop on freshwater by-product applications

Jing Zhang attended a workshop on freshwater by-product applications. China output of freshwater fish (Conventional freshwater fish species in China mainly: snail carp, grass carp, silver

positive development. The table below shows the components of freshwater fish composition.

Taking 50% freshwater by-products, the output of freshwater fish by-products in

international market. The final product is sold normally as food products, promoting beauty and bone health function.

Most of the head, internal organs and fish steak are used to produce low-quality fishmeal and fish oil, or to feed animals directly. Internal organs are a good material for fish oil production as they contain about 20% fish oil. Unfortunately, it's hard to get the detailed data on by-product used for fishmeal and fish oil, but we are hopeful that this will improve in the future.

At the end of the conference, awards were presented for the most innovative

2005-2015 status of fish processed raw material (000MT)			
Item	2015	2010	2005
Processed fish materials	22740	17780	15480
Processed Freshwater products materials	5610	4270	1780
Processed marine products materials	17120	13510	13700

carp, bighead carp, carp, crucian carp and bream.) in 2015 was 28833 kMT, and marine fish output in 2015 was 10363 kMT. At present, the processing rate of freshwater fish is 19%, much lower than marine fish processing rate. While the processing rate has increased rapidly in recent years. The following table shows the status of fish processed raw materials in 2005, 2010 and 2015.

2015 is 2805 kMT. (Not taking into account parts of imported fish, no

Freshwater fish by products	Ratios	Application
Head	16%-18%	Feed or dishes
Internal organs	18%-20%	Feed, contain 20% fish oil
Fish steak	10%-13%	Feed, contain 9% fish oil
Fish scale and fishskin	5%-6%	protein peptide
Total	50%-60%	

As the processing freshwater fish industry has development, by-products have also increased rapidly. There are lots valuable parts in fish by-products and adding more value is always a

internal organs or heads). Fish scale and fish skin is used to produce protein peptide. It's a good choice for companies as the price in China of this protein peptide is higher than in the

products and three of the top five were from IFFO member companies. The first and second products to win were from Coland, and the third was from Zhonghai Ocean.

Guest Columnist: Prof. Min. Xue, Xiaofang Liang

A general overview of the Feed Processing Innovation Team (FPIT), Feed Research Institute, CAAS, Beijing



[This is a brief summary and introduction to the Feed Processing Innovation Team at the Feed Research Institute in the China

Beijing. Dr Auchterlonie met with Prof. Xue during his visit to China in September, and he was impressed that much of the subject matter that the professor and her team are working on, or have worked on, was often directly relevant to the marine ingredients industry. This includes optimising the use of fishmeal in aquafeeds, as well as the safety of antioxidants such as ethoxyquin. We thought the Update

readership would find a general overview of this work interesting, and provide a summary for information, to be followed up with a more specific item in a future edition of Update.]

The Feed Research Institute (FRI), at the Chinese Academy of Agricultural Sciences (CAAS) is a national research institute devoted to animal feed sciences. The FRI has a focus on feed resource development and utilization,

Academy of Agricultural Sciences,



feed and animal product safety, ecological environment safety, and animal product quality. At FRI we investigate all facets of the feed industry, but mainly focus on feed biotechnology, biochemical engineering and extraction, animal nutrition and feed processing technology, feed testing and safety evaluation, as well as feed economy and information.

The Feed Processing Innovation Team (FPIT) was founded out of the Feed Engineering Technology Laboratory and the Lab of Aquafeed Safety Assessment of the FRI. I lead the team at FPIT, along with Prof Junguo Li, Prof Jun Li and Prof Hongyuan Cheng. We are assisted by three research assistants, and a group of research technicians and graduate students.

The research highlights of the FPIT mainly focus on the following aspects:

1. Operation parameters in animal feed processing and modelling and nutrition evaluation:

The characters of protein sources (fishmeal and several plant proteins) and starch sources (wheat flour, corn and cassava, etc.) in floating and sinking extrusion processing were conducted in a twin extruder (MY56X2A). The bulk density modelling was set up to guide the hard operating extrusion, such as low-starch floating diet, high-starch sinking diet; and high plant protein sinking diet, etc. We evaluated the processing parameters and the nutrients

not only useful for the feed formulation, but are also helpful in guiding processing.

A database for the digestibility and processing characters has been set up for more than 50 ingredients in common carp, Japanese seabass and Siberian sturgeon. We have worked out the losing rules of several heat sensitive additives, including vitamin C, vitamin A,D,E,K, phytase and lutein, after grinding, pre-conditioning, pelleting/extrusion and drying in fish feed.

In September, 2016, we co-organised a Workshop of International Feed Processing Technology (Aquafeed Extrusion) with MUYANG Group in Beijing. In the opening ceremony of meeting, an authoritative agreement for building the Co-Platform of Animal Feed Processing Innovation between MUYANG Group and FPIT was signed. More processing and nutrition functions of feed ingredients will be assessed in future in the platform.

2. Fish nutrition and metabolism regulation:

Fish with different feeding habits have different behaviour and metabolism responses to a low fishmeal diet. We focused on the substitution of FM with plant proteins, looking at biosafety and resource abundance. During the past decade, we have conducted more than 20 research trials on alternative proteins with Japanese seabass, sturgeon and grasscarp. These trials included looking

utilization of diets with similar nutrients level but from various protein sources on fish with different feeding habit. The systematic results are

at digestibility, ideal amino acid profile, functions of essential and conditional essential amino acid, fatty acid, food intake regulation in peripheral and central nervous system, etc. A behaviour and molecular regulation mechanism with anorexia in short-term and feeding adaptation in longer-term (4 weeks-8 weeks) was identified in carnivorous fish, with Japanese seabass facing the high plant protein diets. Contrastingly, the herbivorous species, grass carp shows induced anorexia with a high fishmeal diet after 8 weeks of feeding. Other related metabolic diseases, such as hepatosis were studied in vivo (cell line) and in vitro levels. The early nutrition programming (larval stage) and brookstock nutrition intervention approach are being conducted on the plant protein tolerance substrain breeding of Japanese seabass and sturgeon.

3. Efficacy and tolerance of animal feed ingredients and additives:

We have been working on the efficacy and tolerance test of feedstuffs and additives for new products registration in MOA, a project for the National Aquafeed Safety Assessment Center since 2007. More than 10 additives have been evaluated or re-evaluated in the lab, such as, lutein, curcumin, bile acids, selenium yeast, yeast cell wall, and several antioxidants: TBHQ, BHA, BHT and Ethoxyquin in fish diets. The risks and safety margins were identified and some new products have been authorised for commercial use. We have also set up the NIR fingerprint database of fishmeal and choline chloride for adulteration identification. Finally, we have participated in the joint-work of safety assessment on melamine, salbutamol and ractopamine for MOA, and have provided basic data for the regulation and management of these chemicals in animal feeds for the Chinese government.

DNA collected from seawater may solve mysteries about world's largest fish

Using only the DNA from sloughed-off cells floating in the ocean, scientists have been able to determine the population size and genetic properties of one of the world's largest and most mysterious animals: the whale shark. The work marks the first time researchers have been able to use so-called environmental DNA (eDNA) to estimate the genetic characteristics of an aquatic species, and it could help scientists study the population and health of a wide range of marine animals without ever setting foot in the water.

The results are a "conceptual advance," says marine biologist Ryan Kelly of the University of Washington (UW) in Seattle, who was not involved with the research. They "push the boundaries of what is possible to do with environmental DNA."

The research traces its origins to one summer day in 2007, when a worker on a Maersk Oil platform in the Al Shaheen oil field off the coast of Qatar saw a surprising sight: a group of roughly 100 whale sharks feeding near the surface. Scientists hadn't realized that the fish—the world's largest at roughly the size of a school bus—frequented these waters, and the gas field soon became a hotbed for studying this endangered species.

Whale sharks can be difficult to locate, however, because they are often far out at sea. Those at the Al Shaheen oil field were more than 80 kilometers from the coast in the Arabian Gulf. Biologist Eva Egelyng Sigsgaard at the Natural History Museum of Denmark at the University of Copenhagen and her team collected seawater containing skin cells—along with cells from urine and feces—naturally shed by the whale sharks and other animals. The researchers isolated the cells, extracted and sequenced the DNA within them, and then used software to assign some of the DNA to whale sharks, based on the presence of certain gene groups. Sigsgaard and her team also showed that the cells were a good indicator of recent fish activity. Because ultraviolet light and microbes break whale shark eDNA into undetectably small pieces within only a few days, their samples likely traced whale sharks that had passed by recently.

The researchers then used the DNA to estimate the number of reproductive female whale sharks—roughly 71,000. Whale sharks appear to be genetically split between two groups, and this estimate reflects the female population of whale sharks in the Indo-Pacific Ocean

group. This number was broadly consistent with estimates from actual tissue samples, the team reports online today in *Nature Ecology & Evolution*.

In a related study published this month in *PLOS ONE*, scientists showed that eDNA collected off Greenland revealed which fish were most likely to be caught by deep-water trawling, a finding that could revolutionize how marine species are studied. That's because using eDNA is a cheaper, easier option than dragging nets across the ocean bottom to collect tissue samples. "We can get a quite detailed and precise picture of fish fauna using only environmental DNA," says team member Peter Rask Møller, fish curator at the Natural History Museum of Denmark.

In the future, scientists like UW's Kelly envision using eDNA to determine marine biodiversity in difficult-to-sample habitats like rocky ocean bottoms that cannot be trawled. "Does environmental DNA give us useful information about the world that we could not have gotten otherwise?" he asks. "I think the answer is yes."

Source: Sciencemag.org

NOAA fishing head: Science, bycatch likely to remain focus under Trump administration



In a recent interview with Undercurrent News, the US's top fishing regulator Eileen Sobeck said that despite the upcoming change in personnel, NOAA's National Marine

Fishery Service's (NMFS) core objectives -- to develop and maintain sustainable fisheries, to safeguard "protected resources, and to achieve "organizational excellence" through improved administration -- will remain.

"We will always working on our science that's needed to translate into management practices. I think we're going to be focused on bycatch issues," Sobeck, who will leave her post by Jan.

14, said. "We've beat the overfishing monster, but we still could be more efficient in maximizing targeted species and minimizing bycatch. That also goes for protected resource bycatch."

Under the Magnuson-Stevens act, federal fisheries management is delegated to 12 regional fishery management councils which draft fishery management plans and vote on quota allocations. The councils use

surveys and scientific research to gauge the size of a biomass and have broad powers to restrict fishing to rebuild depleted stocks, a system that has worked generally well, Sobeck said.

Magnuson-Stevens

In 2015, NOAA listed 38 species its overfished list, a category which includes stocks deemed to have a population too low to reproduce and provide for its long-term average catch. In 1997, for instance, that figure stood at 86 stocks. Additionally, over the life of the law, 40 stocks that were once overfished have now been rebuilt as of October.

That process hasn't been without controversy. The agency's oversight of the New England groundfish fishery -- where once plentiful cod stocks have waned -- is often challenged by fishermen there who argue that excessive regulation has irrevocably damaged their livelihood.

The same can be said of the red snapper fishery in the Gulf of Mexico where longstanding tensions between commercial and recreational use of scarce allocations have led to lawsuits. The issue routinely dominates meetings of the Gulf of Mexico Fishery Management Council and has also spurred litigation.

"There are difficult fisheries like the red snapper fishery where we've seen a rebounding of the stock and yet many increased opportunity for fishing in state waters but that still translates given the

amount of effort into smaller, shorter federal seasons," Sobeck said. "It's a difficult situation to explain and one of great concern." She added that Magnuson-Stevens has sometimes caused "a lot of pain suffered by our regulated community," she's proud of what's been accomplished under the law's 40-year span and her three years at NMFS. "We have rebuilt what were shattered stocks and we have not just regained the economic footing, we are at levels of economic benefit to industries and communities and individuals that we've never been," she said.

Science focus

Improving sustainability of harvesting means NMFS will continue its focus on fish habitat and improving knowledge of fisheries by getting "more and better data in cost effective ways," she said. That includes how fisheries will be affected by warming waters brought on by climate change, an issue on which Trump sharply diverges from his predecessor, Barack Obama. Sobeck said that NMFS wants to explore how stocks will move from their traditional habitats. "We know that just because we counted fish in a place last year it doesn't mean they're going to be there this year or the year after that or the year after that," she said. On the agency's priority list will be developing detailed forecasts of the potential changes both for commercial fishing and recreational anglers in the short term and longer term.

"It's to allow people to make their plans

whether it's where do I go on vacation next year or where do I put my fish processing plant 15 years down the line. We really need to work on that kind of climate analysis, vulnerability analysis," she said.

Aquaculture

In addition to its fishing duties, NMFS is also focused on offshore aquaculture where the agency wants to promote its development in addition to carrying out its regulatory duties. In the Gulf of Mexico, a regulatory framework under the regional fishery management council there has set the rules for aquaculture in federal waters there. The agency recently held a round table discussion for industry there about the possibilities and new business opportunities.

However, developers of offshore aquaculture have to receive permits from NOAA, along with the Environmental Protection Agency and the US Army Corps of Engineers in addition to other federal agencies. Sobeck said that the agencies are working together to streamline that process, but added that aquaculture also faces substantial perception challenges, a sentiment often echoed by industry. "If we can help communicate to the public that there is this huge market that we have outsourced overseas and there is the potential for US jobs and cutting down transportation costs and so forth," she said.

Source: Undercurrentnews.com



ENFEN 11th November statement



Neutral conditions off the Peruvian coast until the end of next summer

The Multisectoral Committee ENFEN is maintaining the alert

status of 'Not active'. Nevertheless, the sea surface temperature (SST) along the coast of the Peru continued to be slightly above average, although within the normal range. In terms of next summer, the Multisectoral Committee ENFEN, based on the analysis of national and international forecasts and observations, predicts a high probability of neutral conditions in the Central Equatorial

Pacific and off the coast of Peru.

OUTLOOK

It is expected that the sixth cold Kelvin wave, formed during September, will maintain its rate of movement. It should arrive at the coast of South America between late November and December, which would help to maintain the negative temperature anomaly in the water column off the North Coast.

For the next few months, all global models initiated at the beginning of November forecast the development of neutral conditions in the Central Pacific (Niño region 3.4) during the summer 2016/2017. In the same way for the eastern region (Niño regions 1 + 2), all global models continue predicting neutral conditions until the end of next summer.

The Multisectoral Committee ENFEN, based on the analysis of national and

international forecasts and observations, maintains the greater probability of the occurrence of neutral conditions off the coast of the Peru until the end of next summer.

In short, it is forecast that there is a higher probability that neutral conditions are maintained in the Eastern Pacific (79%). For the Central Pacific, the most likely forecast is for neutral conditions (70%), followed by a weak La Niña (23%).

The Multisectoral Committee ENFEN will continue reporting on the evolution of the observed conditions and update monthly the forecast of the probability of the magnitudes of El Niño and La Niña in the Eastern Pacific and the Central Pacific for next summer.

Source: ENFEN

Deep sea quotas agreement



EU fisheries ministers have agreed on the 2017 and 2018 fishing limits (or TACs) for 19 deep-sea stocks, the first time in six years they have reached a unanimous agreement on quotas. The agreement reduces the TACs of most stocks, as is the case for most stocks of black scabbardfish, all stocks of roundnose grenadier, most red seabream and greater forkbeard.

Commissioner for Maritime Affairs and Fisheries, Karmenu Vella, said: "For the first time we will have one deep-sea stock fished at MSY in 2017, which is

good progress. For those stocks for which scientists are unable to give us MSY advice, our compromise recognises that we need to manage these sensitive stocks with caution, as we know little about them and as they recover very slowly." He added that combined with all this, the new element on sharks makes him feel confident that another important step forward has been taken for both stocks and fishermen.

Thanks to this agreement, roundnose grenadier in Northern areas will be fished at MSY in 2017. This is the only stock for which MSY advice is available. A few other TACs are kept stable from 2016, as is the case for the red seabream in the Azores. The agreement adds orange roughy to the list of prohibited species. In addition the Commission had proposed stronger cutbacks for some stocks, but the Council decided for more lenient reductions because of the socio-

economic impact for some small-scale fleets and because some stocks are inevitably fished as bycatch in the demersal (whitefish) fishery.

For Northern red seabream, the fishing limits were reduced and can only be used to cover bycatches. This is done in order to protect the stock, which is at a historically low level and near collapse. A new element of the agreement is that it contains three small, scientific TACs for deep-sea sharks. These are caught as unavoidable bycatch in fisheries that use selective longlines targeting black scabbardfish.

The Commission proposed to allow landing the bycatches on a trial basis, which will help improve the management framework for the black scabbard fishery on one hand and obtain data on deep-sea sharks on the other.

Source: Worldfishing.net

Experts: Seafood processors literally throwing money away

As industries compete to get better value and monetize their product, fishermen need to collaborate to make the most of fish landings, an executive told attendees at Marel's WhiteFish ShowHow in Copenhagen. "There needs to be cooperation from fishermen," said Thor Sigfusson, founder of Iceland Ocean Cluster, during his presentation at the show.

Iceland Ocean Cluster was created to connect different groups within the industry in order to maximize the value of the country's marine products. With the available equipment and machinery, the industry should be able to process every part of the raw material for different markets, but according to Sigfusson, there is little interest from the harvesting side to further utilize fish catches.

During another presentation at the event, fishermen were also called to handle the fish adequately throughout the processing phase, in order to maintain its quality and get high prices for every product for which it will be used. "Catch and on-board handling is the first link in the value chain," said Magnea Karlsdottir, analyst at Matis. "It is important that the fish is well handled and delivered in the right conditions to the next step of the chain if we don't want it to lose its value."

There is an increasing demand in a variety of products based on fish protein. The most profitable industries include pharma, healthfood, cosmetics, beverage and functional food, Icelandic Ocean Cluster's Sigfusson explained. Undervalued cod intestines, rich in enzymes, are normally discarded, but

could reach a value of \$10 (€9.40) per pound depending on its quality if sold to the fish feed market. Fish skin, which makes up 5% of the fish weight and is normally thrown away, can be used for bulk collagen for the nutraceutical market, for some \$7 (€6.60) per pound.

Furthermore, when sold as amino collagen to the beauty industry, it can reach a value of \$75 (€70.80) per pound. The fabric industry pays \$120 (€113.30) per pound to use fish skin for clothing items, highlighting the raw material for its traceable, sustainable cachet. In addition, when used in medicine to heal chronic wounds, for instance, the product can gain as much as \$2,000 (€1,888) per pound.

Source: Intrafish.com

More of world's fishing fleet targeting full utilization

Inge Bertil Straume, sales manager for fishing vessels at Norwegian design group Skipsteknisk, said the world is in the midst of a global movement in the fisheries sector that makes financial, environmental and practical sense: full utilization. "The aim is to take care of everything nowadays," he told IntraFish. "Even on longliners there is a high focus on having the ability to not put anything over the side but bring everything on land. And of course the driver for a business is money and it is a worthwhile

investment."

Karl Bratvold, vessel manager for the Starbound, a catcher-processor vessel harvesting Alaska pollock in the Bering Sea, said the owners of his company saw clearly that they were not maximizing their catch when they decided to invest in onboard processing. "What we had was valuable and it was going overboard," Bratvold said. "We need to capture everything we can."

That led to an ambitious extension and conversion for the vessel, but it was one

that paid off. "Companies running this kind of equipment are making a good profit," said Gunnar Palsson, innovation manager at Hedinn, an Iceland-based protein and meal equipment producer.

Between 1990 and 2000, the price of fishmeal and fish oil was relatively low, so the temptation to add the cost and time onto construction simply wasn't worth it, Palsson said. "Since 2000 however, the price for fishmeal and fish oil has increased a lot -- at least doubled. So it is much more profitable



now than it was. So therefore there is much more interest for having fishmeal and fishoil processing on board trawlers.”

Upwards of 80% of offal can be thrown overboard, and that’s simply money down the drain, Palsson said. “There is probably a little bit more interest in it now than there has been for a while because of two things,” Palsson said. “First not many big trawlers have been built over the past 20-30 years. There were a lot of ships built before 1990, in the eighties, but after that there have

been very few. Maybe in the last five years it has started up again.”

That boom in building has meant a rethink of how vessels are designed, and almost all see fishmeal and oil production as a must-have. “It is quite straightforward, there is a well known method to make fish meal and fish oil and there is a good world market for both these products,” Palsson said. “It is rather expensive, but it is very profitable at the moment and worth the investment,” he told IntraFish.

With fishmeal prices at high levels for years -- it’s worth asking the question: what took so long? “The fluctuation in fishmeal and fish oil prices has been too high over the years and for many years has been very unpredictable,” Straume said. People are always looking for security and from being a high risk product the demand for omega 3 in the form of meal and oil and ultimately protein, is now very good and the medium to long-term projection is also very interesting.

Source: Intrafish.com

Aquaculture's way forward is to embrace zonal management

It’s time to discuss the next step the aquaculture industry must take in the journey towards sustainable seafood farming. The challenge ahead requires providers to think outside their comfort zones but is vital to achieving truly sustainable aquaculture.

This next step – a concept known as zonal management – requires the industry to explicitly recognize that one seafood farm can have an adverse impact on another if they are in close enough proximity to each other or connected through shared supply chains. One farm’s discharge can contaminate the water needed by another and disease can spread unchecked. This problem can affect any type of farm anywhere in the world, be it pangasius farms along the Mekong River in Vietnam, salmon pens off the coast of Chile or shrimp farms in India.

The idea that farms’ health and safety are interconnected is not a new one – many salmon farmers in particular are aware of the potential damage that can be done, and many companies have been imposing their own standards regarding spacing of pens for years.

That’s a great start, but it’s not enough. We must completely redefine our definition of “sustainable” aquaculture to include zonal management measures.

Our current efforts around improvement

are very much focused at the farm level through certification; but a well-run farm is not protected from the disease or water pollution of another farm close by. The certification of farms to a credible standard – like the Global Aquaculture Alliance’s Best Aquaculture Practices (BAP), GlobalGAP or the Aquaculture Stewardship Council (ASC) – is well worth having, but it needs to be combined with the management of entire aquaculture production zones before the industry can become truly sustainable.

This message is already being recognized by BAP in the development of their zone management standard, in the proposed revision to the ASC standard to include area management, and through the inclusion of area management in the additional criteria of the Global Sustainable Seafood Initiative (GSSI) benchmarking tool.

In addition to these very welcome developments among certifications, Sustainable Fisheries Partnership is playing an active role to promote the zonal management approach and support industry players that want to take practical action. In Hainan, China, SFP worked with industry stakeholders to improve the sustainability of tilapia farming. As a result, that sector is now employing zonal aquaculture with positive results.

We should be able to implement zonal aquaculture and achieve sustainable seafood farming using a similar model. Just as the daily work of fishermen is necessarily guided by shorter-term, more immediate goals, we cannot expect the average seafood farmer to focus on the bigger picture. We can, however, expect vertically integrated producer companies, hatcheries, or processors see the value. These companies and related stakeholders have big investments and a clear incentive to support an overarching zonal approach that leads to a truly “sustainable” industry.

Beaver Street Fisheries and Sea Farms are developing an aquaculture improvement project with local processors and the Shrimp Farmers Club in Surat Thani, Thailand, to address farm and zonal management needs to reduce the impact of early mortality syndrome (EMS) and other diseases.

By strengthening, or creating, local industry associations in areas where they source farmed seafood, these companies can help steer producers along a path of improvement based on a locally developed Code of Good Practice that includes a strategy to jointly control disease.

Such an approach can show the market that this is a movement across the whole industry, not just a few farms here and

there. Coordinated disease management creates more consistent and secure production. It reduces the costs for individual farms to manage disease, which also benefits small enterprise farmers and provides the market with greater confidence in consistency and quality of supply.

Effective zonal management can have other benefits as well. For instance, zones can define themselves as distinct

brands in the marketplace and achieve differentiation from competitors. The insurance industry will also welcome greater efforts to reduce production risks and this may have real benefits to farmers in the future through increased access to credit and insurance.

The aquaculture industry is set to continue its dramatic expansion in the years to come but needs to avoid the catastrophes that have bedeviled it in the

past. The risks from disease and pollution can be dramatically reduced by adopting strategies that go beyond the farm level and address the risks across a whole production zone. Today we have a welcome increase in responsibly managed farms; tomorrow we must see the achievement of a sustainable industry.

Source: [GAA](#)

Climate change 'threatens Thai fight against illegal fishing'



Climate change threatens to undermine Thailand's efforts to combat illegal fishing and avoid a potential European Union ban on exports by the multi-billion dollar seafood industry, environmental groups say. They warn that climate change is slowing the recovery of fish stocks in traditional fishing grounds, prompting boats to venture outside Thai waters in search of fish.

"Overfishing plays a major role in the decimation of the fish stock in the Gulf of Thailand and the Andaman Sea, but climate change is just as big a threat," said Suchana Chavanich, a marine biologist at Chulalongkorn University. "Warmer oceans mean that fish don't grow to their full length. Coral bleaching caused by climate change means fish nurseries and their food sources are also under threat," Suchana said.

Thailand's fish stocks peaked in 2006 at 856,212 tonnes of fish caught in the Gulf of Thailand, according to One Shared

Ocean, a group that monitors marine issues.

Four years later it was down to 617,568 tonnes, the last year for which the group has data. The EU issued a "yellow card" to Thailand in April 2015, warning the country should

clean up its poorly regulated fishing industry or face a ban on seafood exports. Thailand is the world's third-largest seafood exporter, shipping \$7 billion worth of fish and seafood products in 2013, according to fisheries department data.

Exports to the EU were 481 million euros (\$511 million) last year, EU figures show. Since the EU "yellow card", the Thai government said it has registered most of its fishing fleet and banned ships fitted with push nets and bottom trawling equipment from going to sea.

As a result, more than 3,500 fishing boats have been unable to leave port for at least a year, according to the Thai Overseas Fisheries Association. Earlier this month, the last of 48 boats seized during operations against illegal fishing were sunk off the Thai coast in an effort to create artificial coral reefs for tourism.

The EU said it is working with Thailand on implementing an action plan and no

deadline has been set for a decision. "The dialogue with the Thai authorities is ongoing," Enrico Brivio, spokesperson for Environment, Maritime and Fisheries, said in an emailed statement.

While the government has sought to avoid an EU ban, it has not done enough to address the effects of climate change on marine aquaculture, said Anchalee Pipattanawattanakul, an ocean researcher at Greenpeace Southeast Asia. "Any recovery made by fish stocks from the government's new illegal fishing initiatives are threatened in the long term by warming oceans," Anchalee said.

Officials at the Department of Fisheries said climate change was an issue for the cabinet and parliament to address. Meanwhile, the fishing industry is skeptical about the government's assurances that the measures it has introduced to combat illegal fishing will lead to a recovery in fish stocks.

More than 300,000 people are employed in Thailand's seafood sector, many of them migrant workers from neighbouring countries. "A lot of the fishermen have come to me for advice about changing industries and what other things they can do," said Abhisit Techanitisawad, President of the Thai Overseas Fisheries Association. "They just don't see their long term future within this industry."

Source: Reuters.com

Investors give South African insect feed firm massive dollar injection



AgriProtein, has generated USD\$17.5m in capital to fund expansion into Europe, North and South America and Asia. This funding round, which included investors such as Australia's Twynam Group, places the value of the company at over USD\$117m and makes it a leading insect feed player globally, said the firm.

Jason Drew, the founder and director of AgriProtein, told FeedNavigator: "Total investment after this round is now approaching USD\$30m." The company produces and licenses MagMeal, a highprotein feed made from dried, milled and defatted larvae produced by Black Soldier Flies (*Hermetia illucens*) that is fed on existing organic waste derived from municipal and other industrial waste partners.

It said it can now recycle 250 tons of waste per day, with its rate of larvae

production currently at 50 tons per day. The company has allocated several international licenses on its technology to parties in Australia, Asia, Europe, the US, and China.

"MagMeal is in great demand we have also been exporting very short term to our licensees to help them establish their local markets before they build factories," said Drew. Source: Feednavigator.com

Allmicroalgae Prepares for Large Scale Production of Algae-Based Omega-3



Portuguese microalgae producer, Allmicroalgae Natural Products S.A., has moved to the next stage in development of new production technologies to grow *Nannochloropsis oceanica* on a big scale, to provide price-competitive omega-3 oil rich in EPA.

"Currently, we're working with strategic partners within the supplement industry to test *Nannochloropsis*. More sustainable and cost-effective to produce, these customers are seeing huge business potential for using *Nannochloropsis* as a source of vegan/vegetarian omega-3. This testing phase is a positive step in assuring the supply of a natural, sustainable source of plant-based EPA," explains Business Development Manager, Sofia Hoffmann de Mendonça from Allmicroalgae Natural Products S.A.

Scaling up for feed applications with fermentation technology

In addition to continuing production of phototrophically grown *Chlorella* and the omega-3 opportunity, another focus area is to finalise the development of microalgae fermentation production. The aim of this development is to be able to serve large volumes not only to the health food market, but also to the feed industry. Fermentation increases production efficiency, and allows an even higher control over the cultures.

Source: Foodingredientsfirst.com

Insect protein in aquaculture step closer



The EU insect sector welcomes the proposal for authorising the use of insect proteins in aquaculture, and considers

the guidance on novel food as good working basis. At its General meeting held on 17 November, IPIFF - the European Umbrella Organisation representing the interests of Insect Producers for Food and Feed - welcomed the recent progress made by EU policy makers on 'key' dossiers for the sector.

Notably, IPIFF welcomed the recent publication of the EU guidance on Novel Food by the European Food Safety Authority (EFSA). 'The IPIFF members highly value this document as 'baseline'

for insect producers to prepare applications in order to authorise their products as food on the European market', said Antoine Hubert, the IPIFF President. 'IPIFF will now further elaborate on this document in order to outline the specificities of insect products and single out the elements which are particularly relevant to demonstrate their safety for human consumption' added Hubert.

Source: Allaboutfeed.net

BUSINESS



Cargill: A new groundbreaking type of canola in development could give aquaculture farmers a more sustainable way to raise fish rich in EPA/DHA omega-3 fatty acids. The plant-based source of the nutrients,

developed in collaboration with BASF, could provide an alternative to using fish oil in aquaculture feed and could ease harvest pressure on wild fish populations that currently supply much of that oil. In feeding trials it conducted with salmon in Chile, Cargill was able to completely replace fish oil in feed rations with oil from EPA/DHA canola. "As a fish feed producer, we need to reduce our dependency on marine resources," Einar Wathne, president of Cargill Aqua Nutrition. "This new canola can create tremendous opportunities across the global food and feed markets, and we believe it is critical for the growth of aquaculture."

Right now, raising fish rich in omega-3s means supplementing their feed with fish oil. This new canola, which is genetically engineered to make long chain omega-3 fatty acids, will offer a more sustainable alternative as it eases pressure on finite marine resources. Testing and regulatory approval for both the canola and the EPA/DHA enhanced canola oil is underway. The EPA/DHA enhanced canola oil is expected to reach the market sometime after 2020. Source: [Cargill](#)



Oceana: Fish catches in European waters could

increase by 57% if fish stocks were fished sustainably and based on scientific advice, according to a new research. The study was led by renowned fisheries expert Dr. Rainer Froese at the GEOMAR Helmholtz Centre for Ocean Research in Kiel in Germany and provides the most comprehensive overview so far of overfishing in European fish stocks, analysing 397 stocks compared to around 150 monitored by the European Commission.

The new study shows that the status of the EU fisheries is far from being in good condition, with 85% of stocks in an unhealthy state and only 12% fulfilling the commitments of the Common Fisheries Policy. "For the first time ever, we know the potential of fish recovery in Europe and it's good news! If we managed fish sustainably and based on science, catches can increase by 57% or 5 million tonnes", said Lasse Gustavsson, executive director of Oceana in Europe. "That's a lot of good and healthy food! It's about time we recover the abundance of European seas as more fish in the sea means more jobs in the fishing industry and more healthy fish on European dinner tables." Source: [Oceana](#)

COUNTRY



Scotland: Investment in salmon farming continues to rise and signals a significant vote of confidence in the long-term sustainability of the sector, according to the Scottish Salmon Producers

Organisation (SSPO). The latest SSPO economic report for the salmon farming industry published Nov. 29, highlights a 16% increase in capital investment to £63.1 million during 2015. The report also looks at pay, employment, training, local and national economic benefits and exports. "The last few years have seen an increased confidence in salmon farming based on the quality of our fish, the international recognition of our

standards of production and the investment in people, technology and innovation," said Scott Landsburgh, chief executive of SSPO, in a statement.

The Highlands and Islands benefit particularly from salmon farming with total gross pay rising by 12% to a total of £71m, according to the report. More than 90% of this is paid out in rural Scotland. Beyond pay packets, wider economic benefits are evident with more than 2,300 companies in the Highlands and Islands doing business with salmon farming companies. From equipment suppliers to hotels the total expenditure in the Highlands and Islands reached £147m. Source: [Undercurrent-news.com](#)

COUNTRY



The US Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) has granted USD 1.2 million to support the development of environmentally and economically sustainable aquaculture in the country.

These awards were made through the Aquaculture Research Program authorized by the Competitive, Special, and Facilities Research Grants Act, administered by NIFA. "In 2015, Americans spent USD 96 billion on seafood, but only a small portion of that was produced by US aquaculture," pointed out NIFA Director Sonny Ramaswamy.

The director explained that to meet the growing demand for this healthy source of protein, NIFA investments are helping enhance US aquaculture production to promote both economic opportunities and a safe, reliable domestic seafood source. Global demand for seafood is projected to increase substantially while harvests from capture fisheries are stable or declining. In cooperation with land-grant university partners and diverse stakeholders, NIFA provides leadership and administers federal funding for aquaculture research, technology development, and extension programs. Source: FIS.com



In the first eight months of this year, Mexico exported fishmeal for USD 17 million to China, which ranks this product as the main one among more than 20 agrifood products Mexico exports to the Asian giant. The sale of Mexican

fishmeal to China began in 2010 with the market expectation of 120,000 tonnes in the Asian country, and this figure has almost doubled in five years. According to statistics from the Secretariat of Economy, in 2015 Mexico exported 215,000 tonnes of fishmeal to China, totalling USD 36.9 million, a value that is higher than that reached for beer (USD 28.5 million) and avocado (USD 25 million).

Last year, the National Health, Food Safety and Quality Service (SENASICA) issued 141 certificates of aquaculture health for marketing different types of fishmeal, including steamed dried fishmeal with antioxidant, Mexican red sardine fishmeal, Mexican 100% fishmeal, middling thread herring fishmeal, fishmeal and mackerel fishmeal, among others, reported SAGARPA. Fishmeal and fish oil export poses great importance for Mexico, since these products are marketed in the United States, Malaysia, France, Holland, China, Indonesia, Japan, Bangladesh, Chile, Greece, England, Germany, Lithuania, Spain, Italy and Norway. Source: FIS.com

RESEARCH



Curcumin plus EPA Omega-3 may reduce cancer-related muscle loss. Curcumin and omega-3 fatty acids may seem like two very different types of ingredients, but a new animal study¹ suggests they may offer a synergistic effect on attenuating the loss of weight and muscle, also known as cachexia, caused by cancer. Researchers found that MAC16 colon tumor-

bearing mice who were given Sabinsa's (East Windsor, NJ)

Curcumin C3 Complex in addition to Eicosapentaenoic acid (EPA) omega-3 lost less weight than mice consuming either EPA or curcumin alone. For six days, the 24 tumor-bearing mice were given Curcumin C3 Complex (100 mg/kg of body weight), EPA (500 mg/kg of body weight), or a combination of both treatments by oral gavage once per day. While EPA or curcumin alone had no observed effect on weight loss, mice treated with the combination of both gained 2g of body weight on the first day of the study and did not experience significant weight loss during the treatment. By the end of the treatment period, the EPA plus curcumin group had lost 1.7 g of body weight, compared to 7.7 g of body weight lost in the control groups, suggesting the combination treatment may be more effective at preventing muscle wasting in cancer cachexia, researchers concluded.



2017

7-9 March	12th North Atlantic Seafood Forum (NASF)	Bergen, Norway
23-24 March	4th IFFO/JCI Fishmeal and Fish Oil Conference	Sanya City, Hainan Province, China
25-27 April	Seafood Expo	Brussels, Belgium
1-3 May	IFFO Members' meeting	Barcelona, Spain
31 May—4 June	World of Seafood - Thaifex 2017	Bangkok, Thailand
3-6 October	GOAL 2017	Dublin, Ireland
11 October	Humber Seafood Summit	Grimsby, U.K.



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