

Skretting Nexus

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Raw Material Issue

NIR Analysis of
Raw Materials

Fishmeal and Fish Oil
Strategic Raw Materials

Residue Testing in
Skretting Feeds

Reduced Fishmeal in
Salmon Grower Feeds

About this issue

James Rose Managing Director - Skretting Australia

Significant research continues into means of reducing fishmeal and fish oil usage and understanding the impact of this on fish performance.

As we reduce marine product inclusion, it becomes ever more important to understand nutritional variation and how to measure this quickly. As the impact of human activity grows, it's important that we carefully manage our resources. Long-term sustainability is a key factor in

the development of Skretting feeds. Understanding the sustainability and supply chain of our raw materials and ensuring that they do not contain undesirable residues is an important issue for our business.

In this issue of Nexus, we touch upon all of these key issues. We also encourage you to visit our website, where you will find more information on the topics covered in this issue.

Nexus



Trials show we can reduce the use of fish meal in salmon grower feeds

Results from a series of salmon feeding trials run by Skretting Aquaculture Research Centre (ARC) in Norway have revealed a new low limit for fishmeal in salmon grower feeds. The trials, conducted on fish from 1 to 5 kg, showed excellent growth and a low feed conversion rate (FCR) on salmon given feed with 15% fishmeal and no land animal protein.

Dr Alex Obach, Managing Director of Skretting ARC, gives some details. "We used three feeds and the best results came from an experimental feed using only 15% fishmeal together with active ingredients we are currently investigating. The two other feeds were a more conventional feed with 25% fishmeal and a similar experimental feed using 15% fishmeal but without the active ingredients. The results totally change our previous belief that the lower limit for fishmeal was 25% unless land animal proteins were used. At present, that is not possible for salmon production in Europe."

The trials were conducted at Skretting ARC Fish Trials Station and Helgeland Havbruksstasjon, both located in Norway. The trial at Helgeland used three groups of 180 fish starting at around 2.6 kg. Over the 73 days they grew to around 4.7 kg. All three groups of fish showed excellent performance. The high fishmeal (25%) control group achieved a relative growth index (RGI) of 169% (specific growth rate/SGR=0.85%/day), however, the group fed the feed with 15% fishmeal plus active ingredients achieved an RGI of 172% (SGR=0.87%/day). The group fed the basic 15% fishmeal feed recorded an RGI of 152% (SGR=0.76%/day). The reduction in fishmeal showed no negative effects on fish quality and monitoring throughout the trials also showed the fish maintained a good health status. FCR was below 1 for all groups.

Dr Obach adds, "It is the first time we have achieved such good results in growth and FCR with low fishmeal feeds without using land animal proteins. Although Skretting will not implement the results yet in commercial feeds, they demonstrate a significant potential for extending our use of sustainable fishmeal over a much greater production of farmed Atlantic salmon. Around two-thirds more salmon could be grown from the same volume of fishmeal."

WHAT DOES THIS MEAN FOR DIETS IN AUSTRALIA?

Fish diets in the EU and UK haven't allowed the use of land animal proteins due to restrictions set by retailers and regulators. Fortunately, in Australia, we do not have these restrictions.

In the Australian market, diets with a 15% fish meal inclusion are already a reality, and have been for some time. However, this research gives us further confidence in our ability to make these diets, in addition to providing us with increased flexibility for the future. If restrictions did ever come to play in the Australian market, Skretting will be well prepared to provide diets substituting with plant proteins.





Fishmeal and fish oil will be strategic raw materials for a long time yet

Fishmeal and fish oil will be essential raw materials in fish feed for many years to come but continuing research will ensure they deliver increasing production and consumer benefits from a sustainable supply.

This was a key message delivered by Skretting UK Business Development Manager Paul Morris to delegates at the international symposium on sustainable aquaculture for Scotland held in Edinburgh in April.

Morris began with a fundamental point, “Fish need nutrients not raw materials. Our task as feed producers is to understand what those nutritional needs are and match them by using the available raw materials. Fishmeal and fish oil provide an excellent balance of nutrients and for many years they have been the economic choice in feeds for aquaculture species such as Atlantic salmon and rainbow trout.”

Now, though, demand for fish feed is increasing because of the global expansion of aquaculture. At the same time, as became clear last year, if prices for vegetable proteins such as soya meal rise too far, fishmeal becomes the economic option in other feeds, notably for raising pigs in China and that market is massive. However, the sustainable supply of fishmeal

and fish oil is stable and unlikely to increase.

Morris continued, “The fishmeal and fish oil used in Europe come mainly from the northeast Atlantic and southeast Pacific. Fishing in these areas is heavily regulated by government enforcement underpinned by scientific advice and codes of practice. Additionally, because we are in this business for the long term, companies such as Skretting have established their own sourcing criteria to ensure their supplies are sustainable. That means the global production of marine raw materials will remain relatively constant over the long term and it will be sustainable at this level.

“We must use this limited supply to deliver as widely as possible the benefits of nutrients such as long-chain omega-3 polyunsaturated fatty acids. Our ability to achieve this comes through research into ways we can supplement fishmeal and fish oil with alternative raw materials. However, we must keep in mind that the alternative raw materials must also be sustainable.”

What is RGI?

RGI, or relative growth index, is a performance indicator of fish growth. RGI is calculated by expressing actual salmon growth (specific growth rate - SGR) as a percentage of growth predicted by a model. The model used to calculate RGI is the global Skretting fish growth model, and takes into account fish size and water temperature.

$RGI = SGR_a / SGR_m$ (where SGR_a is actual growth, and SGR_m is modelled growth)

Using RGI makes it possible to compare groups of fish, even if they are of different sizes, different stock type, or reared under different environmental conditions.



NIR analysis maintains feed quality as raw materials change

Increasing commodity prices and the need for sustainable use of fishmeal and fish oil mean feed formulators are now working with far more raw materials. Skretting is employing the speed, simplicity and accuracy of NIR to ensure customers receive consistent high quality feeds, no matter which raw materials are used.

EVERY RAW MATERIAL IS UNIQUE

All raw materials have their own unique nutritional profiles and the exact nutritional profile of any raw material will vary from batch to batch. It can be influenced by factors such as origin, processing conditions and length of storage. Although tables are available with typical nutritional values for most raw materials, these are only approximations and lead to less precise formulation than is possible with an accurate analysis of every batch.

The NIR analytical equipment installed at every Skretting plant worldwide provides rapid, accurate analyses of all raw materials, also of meal mixes and finished feeds.

"NIR is a very practical method for use by the production teams at feed plants," says Rhys Hauler, Nutritionist and Product Manager at Skretting Australia. "Samples need little or no preparation and results are available almost instantly."

"The information they produce enables us to ensure finished feeds match the specifications precisely and that customers receive feeds with all the benefits we intended."

QUICK, ACCURATE, CONVENIENT

Stuart Fyfe, Process Manager, describes how he uses NIR spectroscopy.

"Analysing raw materials enables us to optimise our blends consistently even though raw materials may change. As an extra check, we run an analysis of the mix before extrusion."

Once extrusion begins, we take further samples for analysis for every 5–6 tonnes of feed produced. Effectively, we are working in 'real time'. This way we can confirm the feed formulation before it leaves the plant as part of the Quality Assurance procedures, and the results provide information for the accompanying documents."

GLOBAL COORDINATION

Alasdair Bradley, Quality Manager, continues. "The specified analytical results for every Skretting feed are held in a central database at Skretting ARC. The teams at each plant have access to that database and therefore can check that their results fit within the specification."

"Taking on-site NIR analysis an important step further, Skretting linked all NIR instruments at the feed plants to a master instrument located in Skretting Aquaculture Research Centre (ARC)."

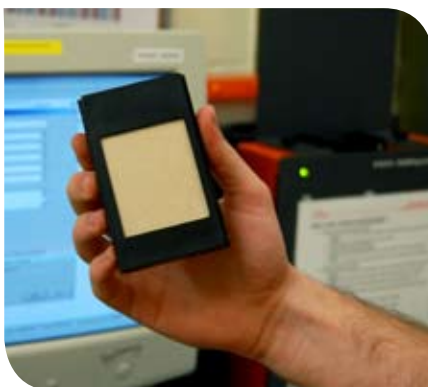
Alasdair explains, "This means the ARC can monitor the performance of each NIR instrument to check that analyses continue to be accurate and identical throughout all Skretting sites.

"The process begins with the delivery of each NIR instrument. Before installation at the feed plant, every NIR instrument is sent to Stavanger in Norway, where its performance is checked and calibrated with the master NIR spectrometer, a process referred to as cloning. When the instrument is installed at the feed plant, representatives from ARC can go with it and provide training in its use and maintenance.

"Each instrument is provided with a standard sample in a sealed tube. This is analysed every day and should always give the same results. If it does not, then the instrument is recalibrated to correct any deviations.

"We have further procedures aimed at maintaining high accuracy. For example, every feed plant regularly sends samples to ARC to check against their analyses and we circulate samples around the plants then compare the results they send back.

"Having NIR spectrometers in every plant and ensuring they are totally aligned means that Skretting feeds are completely consistent in nutritional content wherever they are made."



Stuart adds, "We find the link with ARC is extremely important in controlling the calibration of our instrument. It gives us complete confidence in our results when we check finished feeds before delivery, and we can pass that confidence on to our customers."

CONTINUING PROGRESS

"In 2008, we introduced networking software in the NIR system," says Alasdair. "The NIR spectrometers at all Skretting feed plants are now connected to a central server that collects the analytical data they generate. ARC can view the data and if they see potential problems or irregularities, they can run diagnostics tests from their laboratory and even take over control of the instrument to observe and adjust its performance. This way we have enhanced our QC on the QA instruments.

"Looking further ahead, we are investigating the possibilities of integrating NIR analysis of the raw materials mix in the production line with instant feedback to the manufacturing software. That will give real-time totally coordinated quality control throughout Skretting."

What is NIR?

NIR stands for Near Infrared Reflectance. This form of spectroscopy uses the spectrum of reflected infrared light to provide information about the sample onto which the light is directed. In essence, the various components of the sample will absorb specific wavelengths out of the infrared range. The extent to which each wavelength is absorbed indicates the presence and the proportion of each component in the sample.

Residue testing carried out on Skretting feeds

As reported in the previous issue of Nexus, Skretting conduct regular testing of our feeds for persistent organic pollutants. This is part of Skretting's Quality System, which acts to validate the quality controls performed throughout the year. These controls include frequent analysis of raw materials, supplier assessments and systems to control the pellet manufacturing process.

Skretting's Food Safety Team, made up of representatives from all Skretting companies, regularly review potential residues based on a risk assessment considering the scale of use, toxicity and persistence of each compound. These residues are the focus of analysis for all Skretting operations.

To undertake this testing, Skretting has selected the world's leading laboratories, and all Skretting companies use these approved facilities. In addition, Skretting organises regular ring tests between all of these laboratories to assist the laboratories in benchmarking their precision.

Residue testing is used to monitor long term trends and set raw material procurement standards. These standards include the requirement that products with high residues cannot be blended down to meet allowable limits.

Skretting Australia undertakes residue testing on raw materials and finished feeds, and this monitoring program has been in place since 2004. The results of this program are compiled into the Skretting Australia Residue Monitoring Report. This was first published in 2008, and will continue to be updated every 6 months.

The residue report includes simple information on each of the residues being tested, and longitudinal results. Our customers inform us that this report has become a very useful background tool for supporting their quality standards to their own customers.

The next round of results will be coming out in July. Please contact us if you would like previous reports (sophie.noonan@skretting.com).

Raw Material Focus - Fish Oil

SOURCES

Most of the fish oil used in our feeds comes from fisheries of pelagic species. These fisheries are referred to as reduction fisheries. The main reduction fisheries are in the Pacific, off the coasts of Peru and Chile, and in the northeast Atlantic. The fish oil we import into Australia is predominantly derived from Peruvian anchovy. Fish oil is achieved through pressing cooked whole fish. Pressed oil is run through centrifuges to polish (clean), and stored in bulk tanks awaiting delivery.

BENEFITS

At present, fish oil is the only practical source of long chain omega-3 fatty acids (EPA and DHA). These fatty acids have well-documented human health benefits. Results from NIR testing show that Atlantic salmon fed our feeds can contain at least 3 times the recommended daily intake (please see our Sustainable Aquaculture brochure for more information).

FORMULATION

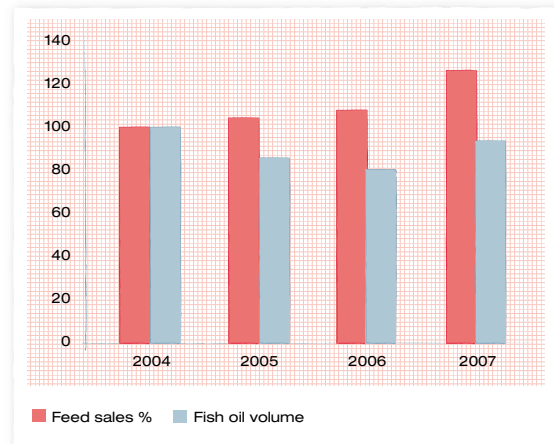
All our fish oil purchases undergo NIR testing. This means we can monitor the fatty acid profile of our fish oil from consignment to consignment, and formulate the product so that the EPA and DHA content remains the same, ensuring our customers, and consequently consumers, receive a product with a consistent fatty acid profile.

SUSTAINABILITY

Skretting Australia have a brochure detailing our sustainability actions, including our fish oil sourcing

policy, information about EPA and DHA, and the future potential to extract these fatty acids from plants. For a copy, please contact us, or visit our website and click on the Publications tab.

The graph below is extracted from our sustainability brochure. It displays Skretting's global fish oil use in salmon diets over the past 5 years, showing that as production increased by 27%, fish oil consumption decreased by 6%.



Fish oil is a finite raw material. The aquaculture industry is increasingly competing with the pharmaceutical industry for these limited supplies. Skretting is investing in intensive research to find alternative sources of the valuable properties that fish oils contain.

Would you be interested in receiving Nexus via email?

If so, please send your email address to sophie.noonan@skretting.com



Previous issues of Nexus can now be found at

Next issue

We will be letting you know more about the outcomes of the Skretting GREEN award, and a recycling update.

Nutreco Annual & CSR Reports 2008

Nutreco, Skretting's parent company, has released their Annual and CSR Reports for 2008. These can now be downloaded from

under the Publications tab.

Aqua Nor 18-21 August 2009

The Aqua Nor trade shows are held biannually in Trondheim, Norway, and recent events have attracted 15,000-20,000 visitors from more than 50 nations.

Aqua Nor has been an important international venue for the aquaculture industry through a period of 30 years. This is where you are introduced to all the novelties, products, services, research and development projects of relevance to the industry.

The aquaculture industry has seen a significant progress in the course of these years, and the fields of technology, processes and services related to the farming of salmon, other marine species, shellfish etc. are all represented at Aqua Nor.