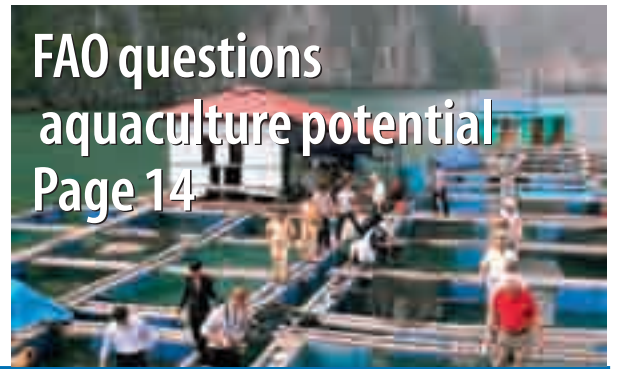




New tilapia standards
Page 4



New Zealand
mussel farming
Page 12



FAO questions
aquaculture potential
Page 14

Aquaculturebusiness

November 2008 Volume 1 Issue 4



Halibut farming

Challenges
remain, but
halibut farming
companies are
making gains in
the marketplace
Page 36



IntraFish

Out with the old...

In this month's issue of IntraFish Newspaper, we told you about some of the exciting changes we're making. We're working hard here at IntraFish Media to set a new standard of excellence for business news and information in the seafood, fishing and aquaculture industries, as well as new channels for marketing.



Opinion

JOHN FIORILLO
EDITORIAL DIRECTOR,
SEATTLE, USA

As part of those changes, beginning in January, we're reshaping Aquaculture Business as well. Aquaculture Business, which we first conceived in early 2007, was launched in 2008 to serve the aquaculture industry with business-focused news coverage of the people, businesses and trends that shape the sector. The response from readers and advertisers has been enormous – there is a clear need for real business news about the fish farming sector.

Of course, our game plan changed slightly in late 2007, when we acquired the Heighway Group, which included Fish Farming International.

Fish Farming International is a global leader in news and insight into the world's aquaculture industry, and has been for decades. We're going to build on that strength with IntraFish's expertise in business news by adding the great content from Aquaculture Business into the pages of Fish Farming International.

For our readers, that means in-depth coverage unlike any you've seen before. Our staff has decades of expertise in the sector, and you'll see more news and information about the topics you care about, and the businesses that drive them.

For our advertisers, the combined readership of Fish Farming International and Aquaculture Business will give you access to an unrivalled audience of aquaculture industry professionals.

We're looking forward to serving the aquaculture industry with our new publication. Thank you for your support.



BIG GROWTH: IntraFish Media is combining the strengths of Fish Farming International and Aquaculture Business.

PHOTO: THOR NIELSEN



On intrafish.com



Economic forecast

The global economy is suffering a bad case of the flu. From Russia to New York, banking and financial institutions are in turmoil. A global credit crisis, reduced global economic growth, high commodity prices, cuts in fishing quotas and substantial contraction in investment are all impacting the global seafood sector. To stay on top of the fast-changing economic crisis, be sure to read IntraFish.com every day.

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Graphic: Erik Dyngeland

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The group also operates the daily online news services IntraFish.com and IntraFish.no and publishes The Wave, a daily electronic seafood industry newsletter.

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Net notes

GAA talks downturn

The economic downturn has forced the Global Aquaculture Alliance (GAA) to change the program at its annual conference in October to address the impact on members' operations.

Global Outlook for Aquaculture Leadership (GOAL) 2008 will now address how the crisis may affect aquaculture producers, processors and retailers throughout the seafood industry, as well as the impact on sustainability.

GOAL 2008 will be held Oct. 28-31 in Qingdao, China.

Production speakers and panelists will begin by discussing impacts of the economic crisis on production already hit by rising costs for feed and energy. On Oct. 30, market speakers will examine how the crisis will likely affect consumers and markets in the United States, Europe and Japan.

On Oct. 31, Darden Restaurants Vice President of Protein Procurement Roger Bing will speak on the varied market impacts of the economic crisis during the "Issues" sessions.

After his presentation, panelists representing a cross section of sectors within the seafood industry will take questions regarding the direct effects of the crisis on profitability and its indirect effects on sustainability. —IntraFish Media

Clean Seas to share tuna research

The two global leaders in bluefin tuna propagation have joined forces.

Australian aquaculture pioneer Clean Seas Tuna and Japan's Kinki University have signed an agreement to exchange tuna propagation and husbandry technologies.

The deal was signed at Kinki University, in Wakayama prefecture near

Osaka, by the chairman of Clean Seas, Hagen Stehr, and Kinki University director Professor Osamu Murata.

This agreement will establish a visiting scientists program that will see Clean Seas scientists working in Japan and Kinki University scientists working in South Australia. It also has the potential to extend co-operation between the Japanese and Australian governments.

Kinki University's northern bluefin tuna hatchery technology program began in 1970, resulting in the spawning of the fish under natural ocean conditions in net cages off Wakayama in 1979 and the first completion of the lifecycle in 2002.

Clean Seas earlier this year announced the world-first hatching of live and active southern bluefin tuna larvae at its land-based breeding facility at Arno Bay on South Australia's Eyre Peninsula.

Clean Seas' first step in securing sustainable production of the premium endangered species was achieved just 18 months after starting its breeding project. —IntraFish Media

EU still waiting for aquaculture growth

Europe's once-lucrative aquaculture industry is stagnating, beset with red tape, over-regulation and zealous planning authorities, a Scottish politician warns.

"Europe used to lead the world in the production of farmed fish and Scotland was at the forefront of the industry. But in recent years we've taken our eye off the ball," said Scottish Conservative European Member of Parliament Struan Stevenson.

Stevenson, speaking at the conference "A Coherent Approach to Sustainable Development" in Brussels, said Europe has allowed non-EU competitors "to assume dominance in this rapidly developing sector," resulting in job losses and missed opportunities.

Stevenson warned that EU regulations on aquaculture were leading to the growing seafood trade imbalance.

"Marine aquaculture is the fastest growing food sector in the world, growing at 9 percent per annum everywhere except in the EU, where growth is stagnating," he said. —IntraFish Media



PHOTO: HILLEL WRIGHT



PHOTO: REUTERS



GETTING BETTER: WWF and GAA are seeking comment on their new draft tilapia-farming standards. PHOTO: ELITE SEAFOOD

GAA, WWF roll-out standards for tilapia

The World Wildlife Fund (WWF) released a draft of its much-anticipated tilapia aquaculture standards, just on day before rival Global Aquaculture Alliance (GAA) did the same.

WWF is seeking public comment on the sustainable farming standards, which were developed through the group's tilapia dialogue process over three years.

Comments on the draft standards will be accepted through February. The purpose of the public comment period is to gain input on how to perfect the standards so they are effective and attainable, WWF said.

Click here now to view and comment on the tilapia standards.

"When finalized, these will be the world's most robust standards for the tilapia aquaculture industry," said Jose Villalon, director of the WWF-US Aquaculture Program. "They also will be the most credible standards, as they will be the outcome of three years of open discussions and consensus building among leaders in the tilapia farming industry."

The draft standards were developed by a group of tilapia producers, seafood buyers, non-profit organizations, and other tilapia aquaculture stakeholders.

The dialogue is driven by a steering committee that includes representatives from Regal Springs Trading Co., Sustainable Fisheries Partnership, New England Aquarium, Aquamar, Rain Forest Aquaculture, and WWF.

The standards are designed to minimize the impacts, identified by participants, that cause 70 percent to 80 percent of the problems associated with tilapia farming.

This includes chemicals -- used to treat diseases or preserve tilapia -- being released

into the water, non-native tilapia escaping from farms and competing with wild-caught fish, and water being diverted for use on farms.

The standards will be posted for two months, in accordance with the International Social and Environmental Accreditation and Labeling (ISEAL) Alliance's Code of Good Practice for Setting Social and Environmental Standards.

Dialogue participants will have one month to review the comments before posting an updated version of the standards that reflects the comments received. This three-month cycle will be repeated once. Final standards are expected in March.

When finalized, the standards will be given to a standards-holding entity that will use independent third-party certification bodies to audit farms. Third-party involvement ensures fair and effective management of the standards.

WWF is working with its partners to assess which standards-holding entity -- new or existing -- to use.

Through its aquaculture dialogues, standards are being created for farmed salmon, trout, pangasius, shrimp, abalone, clams, mussels, scallops and oysters. WWF has initiated similar standards-development processes for wild-caught seafood, forestry products and potatoes.

A day after the World Wildlife Fund (WWF) released its draft standards for sustainable tilapia farming, the Global Aquaculture Alliance (GAA) said it completed its own Best Aquaculture Practices (BAP) standards for tilapia farm certification.

Tilapia facilities can achieve BAP certification by contacting the Aquaculture Certification Council (ACC), the international body that implements the cer-

tification program, the group said.

The tilapia standards are the result of a two-year development process directed by a technical committee chaired by Ecuadorian tilapia specialist Lorena Schwarz, who also participated in the WWF tilapia dialogues.

The process benefited from a public review in which comments were received from both conservationists and aquaculture professionals. The standards were revised following feedback from field trials in Thailand and China.

WWF's draft tilapia standards are expected to be finalized by March, following a public comment period. When finalized, the standards will be given to a yet-to-be-determined standards-holding entity that will use independent third-party certification bodies to audit farms.

"BAP certification provides a realistic objective for the majority of tilapia farmers, and as such will serve to shift the whole industry on a path to greater sustainability," said BAP Standards Coordinator Daniel Lee. "As with the BAP standards for shrimp and channel catfish, environmental, social, food safety and traceability concerns are dealt with in a clear and consistent manner."

The BAP standards and guidelines for tilapia farms apply to cage and net-pen farming as well as pond culture. Whatever the system, farms must comply with regulations regarding the use of non-native species.

Regular monitoring of water quality and effluents is required. If used, drug treatments must be approved therapeutants applied only to treat diagnosed diseases. The standards encourage producers to use methods other than hormone treatments to obtain all-male fry, GAA said.

—IntraFish Media

WWF to hold first trout dialogue

Chilean salmon production could fall by as much as 20 percent in 2009, says SalmonChile President Cesar Barros.

BY INTRAFISH MEDIA

The process of creating the world's first set of credible standards for minimizing the key environmental and social impacts of the trout aquaculture industry will begin in November, when the inaugural meeting of the World Wildlife Fund's trout aquaculture dialogue is held.

The world's leading trout farming experts and stakeholders are expected to attend the open meeting, to be held Nov. 19-20 in Copenhagen, Denmark, one of the top regions in the world for producing trout.

They will focus on farmed freshwater rainbow trout, which is considered a delicacy in many nations and is one of the oldest types of aquaculture in the world.

"We are confident that, by addressing sustainability, the Dialogue process will add further value to our aquaculture products," said Brian Thomsen, director of The Danish Aquaculture Organization. "So it is a win-win situation for everybody. We welcome this new initiative and are thrilled that it will kick off in our own backyard."

One of the main goals of the meeting will be to identify the key environmental and social impacts related to trout farming and create the guiding principles for addressing each impact.

"Almost all of the trout we eat comes from a farm, so reducing the impacts from this type of farming is critical," said

Aaron McNevin, aquaculture specialist for World Wildlife Fund (WWF), the organization that will be convening the meeting.

"Through the dialogue, we'll use the best science and get input from as many people as possible in order to create the most robust standards for the industry and the environment."

At the November meeting, participants will develop the criteria that will provide direction on how to reduce each impact. At future meetings, participants will create indicators that will address how to measure the extent of each impact.

All of this information will be the framework for developing measurable, performance-based standards.

Other agenda items will be creating a steering committee to manage the dialogue, as well as identifying research that needs to be done to address



SEAL OF APPROVAL: Will farmed trout soon have an eco-seal? PHOTO: INTRAFISH

any areas of disagreement between participants and fill information gaps related to trout aquaculture.

The trout dialogue is one of seven WWF-initiated dialogues

under way globally. Standards also are being developed for salmon, tilapia, shrimp, pangasius, abalone and four types of molluscs: clams, scallops, oysters and mussels.



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TIT FOR TAT: New research has found salmon can yield more protein than the amount used in their feed. PHOTO: OYVIND ELVSBORG

Salmon yield more protein than feed

Around 800,000 salmon produced at CAC research station in Norway yielded more fish protein than was used in their feed, without reducing omega-3 levels in the flesh, according to feed manufacturer Skretting.

The results show salmon farming can be a net fish protein producer and that limits in the supply of marine raw materials do not need to limit expansion in the aquaculture industry.

The objective of the trial being carried out at CAC is to fully document the sustainable production of salmon.

CAC is a large-scale research station where all harvested salmon are sent for commercial sale. The facility is owned by Marine Harvest, Skretting and Akva group.

"The trials at CAC are a milestone," says Knut Nesse, managing director of Skretting Salmon Feed. "This is the first time we can refer to large-scale trials on fish over an entire generation, where we gain more fish protein in the form of salmon than we use to produce the fish feed."

"The world's marine resources must be shared among an ever-growing number of people. In this perspective, the findings open up great opportunities for the aquaculture industry."

At CAC, the fish are divided into three groups, which are fed separate diets. One of the

groups are fed on feed that is almost identical to Skretting's normal diet, but with a slightly higher vegetable oil content. The other two groups are given feed in which even more of the marine protein raw materials have been replaced with vegetable raw materials. It is these two groups that are yielding more fish protein than has been used in production of the feed.

Preliminary figures from the pens that have been harvested show that the feed that contains fewest marine resources gives just under 1.2 kilograms of top-quality fish protein in the form of salmon for every 1kg of fish protein used in the feed.

Control of the fatty-acid levels has been part of the trials and findings have been positive, showing normal levels of omega-3 fatty acids, including the long-chain omega-3 fatty acids EPA and DHA.

"Final figures will be ready nearer to Christmas when the trial is concluded," said Olav Breck, R&D manager in Marine Harvest Norway. "The results are very positive so far. Finding replacements for marine raw materials is a prerequisite for future growth in the salmon industry. At the same time we are engaged in securing the health and welfare of the salmon as these changes are made." *-IntraFish Media*

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Chile's region 10 is declared a labor crisis zone

BY PAULA CARVAJAL

Salmon workers received an answer to the letter they delivered in October to Sergio Galilea, head of the local government of Region 10, and say he committed to declaring the area in a labor crisis.

Javier Ugarte, president of the National Confederation of Salmon Industry Workers (CONATRASAL), said he was quite satisfied after meeting Galilea on Tuesday.

The aim of the meeting, in which Galilea gave a written reply to the petitions of salmon workers presented a week ago, was to give answers to the unemployment that is increasing in the provinces of Chiloe and Llanquihue due to the crisis of the salmon farming industry in those communities.

According to Ugarte, Galilea told the delegation of salmon union leaders Region 10 will be declared a major labor crisis zone.

"This is undoubtedly due to the number of layoffs that have occurred in the industry, which are already over 4,000," said Ugarte.

An intersectorial roundtable will be formed to have all those pertinent services to establish a series of measures to reduce the negative impact on jobs, he said.

"Galilea will coordinate this instance through Claudio Perez Barros, his special affairs advisor. The main objectives of this roundtable are to implement special policies and programs



Chilean salmon worker unions say the industry is in a labor crisis, with more than 4,000 jobs already lost in the country's salmon farming sector.

for unemployed workers, including training, support for small businesses and subsidized housing programs," Ugarte said.

The letter Galilea delivered to the workers said: "All pertinent efforts will be made to form a tripartite roundtable made up of the government, representatives of the salmon industry and workers with the aim of jointly addressing the impact of such crisis."

Work will start between the city hall of Chiloe and the district administration of Puerto Montt, whose unemployment rate has increased recently.

Galilea told the salmon union leaders he will ask the central government to establish a national work roundtable on the labor crisis in the "golden egg" salmon industry, with the participation of the labor ministry, ministry of economy and fisheries undersecretariat,

whose nature will be similar to that of the salmon roundtable.

Ugarte said he was invited to join the salmon roundtable, chaired by Economy Minister Hugo Lavados, which recently adopted sanitary measures to mitigate the crisis caused by the infectious salmon anemia (ISA) virus -- and which to this point has not considered the workers' opinions.

Two union leaders who are spokespersons for salmon industry workers -- Ugarte and Doris Paredes, president of the provincial Federation of Trade Unions (CUT) of Llanquihue -- will travel to Santiago on Thursday with Alejandro Salinas, the director of the Labor and Environmental Observatory of Chiloe (OLACH), to meet with Lavados and Osvaldo Andrade, the labor and social security minister.

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RICH RESOURCE: Farmed halibut companies such as Norway-based Marine Harvest expect the fish to become more popular in coming years with consumers.

PHOTO: MARINE HARVEST

Farmed halibut ready for prime time



With success at foodservice, Marine Harvest looks to move halibut into retail.

BY JASON HOLLAND

In just seven years, Sterling white halibut has gone from being the pet project of an aquaculture giant to the toast of internationally renowned chefs. The ultimate goal is to expand the product to high-end retail, says the man behind the venture, said Magnus Skretting, Marine Harvest's

READY FOR RETAIL: Seafood retailer Delizzimo, which in August scooped a much coveted Gold Star award from the Guild of Fine Food for its beetroot-cured halibut, makes the product with Marine Harvest's farmed halibut.

managing director of coldwater species.

Succulent and white, Sterling halibut is farmed in the cold, clear, deep fjords of Ryfylke, Norway. Easy to prepare and versatile in use, halibut's exquisite taste complements the aromas of other ingredi-

ents. The species is rich in protein and vitamins, and has a high omega-3 fatty acid content. It's these properties that led to the fish being used as one of the dishes to challenge chefs during the Bocuse d'Or contest held in Lyon, France, in January 2007.

Marine Harvest is currently producing around 1,100 metric tons of halibut per year, which is around 70 percent of the total global production, said Skretting.

"In the grand scheme of things, it's a small business but

an important one all the same," he said. "The feedback from the market has been that Sterling is a state-of-the-art, premium fish. It's accepted in our main markets of Norway, Sweden and the U.K., but we have more to do."

Moving into retail

Retail is the arena in which Skretting sees the long-term future of the fish, and he recently hooked up with young U.K. enterprise Delizzimo, which in August scooped a much coveted Gold Star award from the Guild of Fine Food for its beetroot-cured halibut, made with Marine Harvest's fish.

Delizzimo is run by Liz Fryer, who has retail ambitions of her own, and Skretting says by working with her and similar innovators the Sterling product can move on to another level.

"First of all, we wanted chefs to regard it as a premium product, and once we were there we wanted to move into high-end retail. We are at that stage now and it's a really interesting time for us," he said.

What does Marine Harvest's farmed halibut offer the market that wild-caught fish cannot?

"First of all, stability when it comes to quality – that's our unique selling point. This fish is both accepted and respected. Customers know what they are getting week after week, and I think that's one of the most important arguments for aquaculture," said Skretting.

"Secondly, it's a very safe product, whereby production is controlled from egg to market. We record everything from feed, grading and weight to fat content, harvesting results and fish mortality."

Down on the farm

Marine Harvest is certified according to ISO 9000 and ISO 14000 standards for the entire value chain. In addition, its processing plant is certified according to BRC standards.

To attain the best possible results, Marine Harvest has set up its own hatchery, located north of Trondheim.

The halibut spend the first part of their life (until they reach 1.5 kilograms) in protected conditions in landside tanks with large volumes of fresh seawater, where individual fish have their own "living area."

Halibut need a stable temperature of 11 degrees Celsius and it is much easier to do that on land, said Skretting.

Eventually, the fish are moved to open pens in the fjords, and the living area is extended as the halibut increase in size, giving them ample space to move and rest.

"We have two sea sites, comprising a total of 32 cages, where we keep the halibut until they reach an average market size of around six kilos, although Marine Harvest can provide fish from one kilogram to 15 kilograms. This growth process, from egg to market, can take five years."

Halibut require a lot of space, and at Josen Fjord, one of the open sites, the water is 650 meters deep.

The farm can raise a maximum 1,300 metric tons of fish, with each cage containing between 100 metric tons and 110 metric tons. It does this by utilizing an innovative shelf system that creates the necessary amount of flat rest areas – imitation seabeds the bottom-dwelling species prefer.

These shelves are suspended in the cages by red and yellow buoys, and the fish are closely monitored underwater by a series of remote cameras.

The main risk to the fish while they are being farmed is the long lead-in time, Skretting said. March and April tend to be the most dangerous months on the calendar, due to the annual climate shifts experienced in Norway.



ROOM TO GROW: Farmed halibut spend the first part of their life in protected conditions in landside tanks with large volumes of fresh seawater, where individual fish have their own «living area.»

"But after seven years, we can say that there is not one thing that is creating any big problem for us."

Long road

That's not to say the seven-year path to where the company is now hasn't been a rocky one. A few years ago, Marine Harvest found its halibut were having problems with eye migration because of a nutritional flaw, and this is now a thing of the past. "We now only use marine raw material in the feed and these are sourced from sustainable stocks, he said."

His team is working on a pigmentation defect seen on the underside of the fish. "The top side of the fish is perfect but the underside does not exactly replicate that of wild," he said. "But we will sort that. It was more important to get the correct pigmentation on the top of the fish."

Marine Harvest's halibut is currently being sold into four main markets – Norway, Sweden, United States and United Kingdom – and the company will focus on developing retail opportunities in these countries and others.

"Asia is very interesting when it comes to these fish, but we probably don't have enough volume. If we were to take this product to Japan, I am convinced there wouldn't be any left for the rest of the world. But it is one for the future, of that I am certain," said Skretting.

Because production is relatively low, demand for the hal-



PLATE READY: Farmed halibut is a favorite with chefs in Europe, who like the fish for its taste and reliability. PHOTO: ARE KVISTAD

ibut is high, said Skretting, and as a result Marine Harvest is receiving a good price for it.

At the Billingsgate Fish Market, where Delizzimo sources its fish, the current prices for Sterling white halibut are: £8 (\$14.45/€10.30) per kilo for three- to five-kilo fish; £9.50 (\$17.15/€12.23)

per kilo for five- to seven-kilo fish; and £10 (\$18.05/€12.88) per kilo for seven- to 10-kilo fish.

Each week Delizzimo is selling between 40 and 50 units of its beetroot-cured halibut, each unit is usually between 100 grams and 200 grams. "It's not a cheap fish to use," Fryer said.

Echoing the words of Skretting, she said: "Freshness is the most important factor for us. With the wild halibut you can't always guarantee it's the freshest that it could be. Our beetroot-cured halibut looks and tastes amazing; it would be a mistake to cheapen it with an inferior raw material."

Is New Brunswick ready to farm halibut?

Researchers say, yes, and they have the data to prove it.

ERIN DWYER

Tillman Benfey and a team of academics should know by next spring whether or not halibut aquaculture has the potential to be a multi-million dollar industry in New Brunswick, Canada.

That's when the professor of biology at the University of New Brunswick in Fredericton expects all the data will be in from a three-year research project looking at the viability of farming halibut in the Bay of Fundy.

So far, the evidence points to a positive conclusion.

"Everything so far is looking very encouraging," he said. "It will mean that we have an opportunity to diversify our aquaculture industry here in New Brunswick."

Beginning this month and over this coming winter, the first halibut from the research team's test population of 50,000 fish will be harvested and sent to market, where they could fetch upwards of CND\$6.50 (\$6.22/€4.09) per pound more than twice the return on the area's farmed salmon.

Slow and steady

For the last three years, the test fish have been growing inside aquaculture cages in Lime Kiln Bay, off St. George, New Brunswick, owned by the company Canadian Halibut.

A research team, including Benfey, has been looking at all aspects of farming halibut – from the optimum time to introduce juveniles from hatcheries to cages and the best way to feed them, to the shape of the cages and the profitability of bringing them to market.

"I think we are at the point now where we have enough data to show the Atlantic Canada Opportunities Agency, Business New Brunswick and even the banks that it's worth pursuing this," Benfey said. "It's certainly not going to be a bust. On the biological side and the economic side, it looks promising enough that we can encourage investment."

A great opportunity

Skip Wolf is someone who cannot wait for Benfey's results. The owner of Canadian Halibut, he's been struggling to gain government confidence in this new aquaculture industry.

"It will give us some good solid numbers to use to make our projections," said Wolf. "And it will also show people in



LOOKS PROMISING: Researchers say eastern Canada has suitable conditions for halibut farming, but some challenges exist.

PHOTO: INTRAFISH.

government and the development agencies whether halibut farming is really viable, and it is. This will have the numbers to prove that."

Benfey and the team of researchers received \$157,105 (\$131,670/€98,959) from the New Brunswick Innovation Foundation as well as \$1.8 million (\$1.5 million/€1.1 million) in government funding for concept validation of the viability of raising halibut in an aquaculture environment.

Benfey's curiosity about fish began as a small child growing up in Montreal. There, he spent hours fishing alongside his father in the St. Lawrence and Ottawa rivers. Today, he's less interested in wild fish than he is in the ones that live on farms.

"People tend to forget that 10,000 years ago we hunted wild animals and gathered wild plants to eat. We don't do that anymore. We made this transition on land to farming, and yet up until fairly recently, for all of our aquatic foods, we still basically hunted and gathered them from the wild.

"It's a logical progression, as the population grows, to move away from hunting and gathering toward farming."

More than salmon

Salmon aquaculture is well established in New Brunswick, with 96 marine sites. However, global production has driven prices down in recent years.

"The question becomes," said Benfey, "are there other species

we can put in cages in the Bay of Fundy that have a better payback or more profitability than salmon?"

One of the obvious species to look at was halibut, which fetches about twice as much per pound as salmon.

Benfey and his colleagues – researchers from the University of New Brunswick St John, an economist, a veterinarian from the University of Prince Edward Island and scientists from St. Andrew's Biological Station – have been figuring out how it can be done in the most sustainable and economical way. That has meant addressing the differences between salmon and halibut.

For example, halibut are strictly saltwater fish that spawn in the ocean and whose eggs float in the water. Salmon, on the other hand, spawn in freshwater and dig their nests in streambeds.

"Those different life histories mean that the whole hatchery design for raising halibut eggs is totally different from salmon," Benfey says.

As well, the circular, suspended net of a salmon cage dips into a cone shape at the bottom. That's fine for salmon that spend most of their time on the surface of the water, but it is not suitable for bottom-feeding halibut that prefer to lay on the ocean floor.

"You can't put halibut in a cage like that," he says. "If you did then a lot of the fish would suffocate."

For halibut, the cages need to have a rigid bottom so the net lies evenly on the ocean floor. In Norway, fish farmers are even experimenting with shelves inside the cages to provide more surface area for the halibut.

Scientists also need to consider the deep-water environment of halibut.

In nature, Benfey says, halibut would not be exposed to wave action, rapid temperature changes, or sunlight.

Fortunately, in the Bay of Fundy, water temperatures remain fairly stable, but the cages would need to provide sun protection for these deep-water dwellers, which rarely see sunlight.

"If the waters are too shallow, these fish can actually get sunburned."

At the same time, scientists have to consider the risks of establishing halibut aquaculture in waters where salmon is already being farmed.

Benfey and his team are interested in knowing if halibut are carriers of pathogens that, while they may not affect halibut, could cause disease in salmon, and vice versa.

In any case, establishing halibut farms would require more regulations added to an already strict set of rules managing the salmon aquaculture industry in New Brunswick, says Benfey.

"This now complicates things, bringing in a different species."

So far, Wolf's halibut farm in Lime Kiln Bay is the only one in New Brunswick. Other coun-

tries, however, have shown that the industry is feasible. Norway, Iceland, Scotland and Chile are all growing halibut.

Benfey repeatedly points out, however, that halibut aquaculture, if proven to be viable, will not replace salmon farming, which has become a significant contributor to the provincial economy, supporting 5,000 direct and indirect jobs.

It will, however, add jobs, require expansion of processing plants, provide work for manufacturers of aquaculture cages and fish food producers, and diversify the industry.

"It will complement the salmon farming industry," says Benfey.



MAKING THE CASE: Professor Tillman Benfey of the University of New Brunswick is leading a research team studying growing halibut commercially in eastern Canada.

PHOTO: PETER WALSH/TELEGRAPH-JOURNAL



EXPORT PHENOMENON: New Zealand is the world's only producer of the *Perna canaliculus* variety greenlipped mussel. PHOTO: Absolute Foods Ltd

The mystique of greenlipped mussels

Known for its great looks and savory taste, the New Zealand greenlipped mussel is more popular than ever.

BY JASON HOLLAND

Against a backdrop of recession, New Zealand still has a booming seafood export industry largely thanks to its much coveted greenlipped mussel.

New Zealand is renowned for its thriving seafood industry, especially the production of its greenlipped mussel (*Perna canaliculus*) which, valued at NZ\$175 million (\$110.2 million/€81.6 million), was the country's top seafood export earner last year.

Over the past 20 years, exports of greenlipped mussels, also known and trademarked as Greenshell mussels, have increased from 5,000 metric tons of finished product worth NZ\$25 million (\$19 million/€8.8 million) to more

than 36,000 metric tons. This growth is heralded as one of the country's prime export achievements of recent times.

Even with the current economic slowdown in many of New Zealand's key export markets, the demand and value of Greenshells continue to gain momentum, as does their reputation as being the preferred mollusc of leading chefs globally.

Matching the mussels with the country's Sauvignon Blanc is widely regarded as one of the world's great natural food and wine pairings.



The New Zealand mussel is truly amazing: the shells themselves are possibly the most beautiful seafood 'wrap' in the world.

Depending on the dish they can be quite stunning and create wonderful visual plate architecture.'

Jason Dell, executive chef Blanket Bay

Ian Langridge, Managing Director of Auckland-based international supplier Absolute Foods, said besides the delicious taste of the bivalve, the redeeming quality of this mussel, partic-

ularly in tighter economic times, is the assurance of quality and supply.

"The Greenshell has always been a year-round performer and chefs have been reassured by the delivery of consistent supply and consistently high quality," he says.

"The high meat-to-shell ratio both enhances customers' value perception and requires fewer shells for an impressive display, reducing plate costs and increasing margins. Of significance is that consumers can be assured they are eating one of the safest mussels in the world. It's possibly one of the most iconic representative of New Zealand's seafood history and became the country's most valuable export species in 2006."

Jason Dell, executive chef at New Zealand's famed Blanket Bay, a member of the Small Luxury Hotels of the World, concurs. "The New Zealand mussel is truly amazing; the shells themselves are possibly the most beautiful seafood



FROM THE FARM TO THE WORLD: New Zealand mussel farmers now supply 76 overseas markets. The United States, Korea, Spain, the United Kingdom, and Australia are the top five markets for Greenshells. PHOTO:

'wrap' in the world. Depending on the dish they can be quite stunning and create wonderful visual plate architecture.

"I love the firm texture and bite of the meat, and there's a savoury-sweet thing in the meat that makes the mussel the perfect partner for some amazingly robust sauces. I'm told the Greenshell is exceptionally rich in glutamic (amino) acid, and when

cooked that turns into glutamate and accounts for the high umami (fifth taste) or savoury value."

At Blanket Bay, live mussels are steamed in a fragrant spicy sauce of tomatoes, black bean, white wine and garlic for the lunchtime menu.

The resort's chefs often make petite kumara and mussel fritters and serve them as a canape in their shell for pre-dinner drinks.

Dell also likes to grill half-shell mussels with a delicate preserved lemon, tarragon and macadamia crumble as an appetiser.

Plate-safe

The country's mussel aquaculture industry should be applauded for its export success – it is both tightly managed and controlled, with farms adhering to a strict environmental management system.

In addition, water and shellfish quality programs have been set up to monitor and maintain farming standards – to ensure they comply with national water quality and marine biotoxin programs – and with stringent U.S. Food and Drug Administration standards.

There are concerted and collaborative efforts between industry, regulators and enforcers to maintain the pristine status of growing waters.

In addition, Greenshell mussels are highly traceable. Any packaged product in the market can show the date the product was harvested, who harvested the product, when it was processed and the processing company.

A product can be traced right back to the time it was seeded out as a juvenile mussel, the actual crop line and the events that occurred in the water in the growing cycle.

"I understand that the New Zealand growing systems are now used by other countries," said Dell. "I was working as a chef in Marlborough when the New Zealand mussel industry was still developing, so I know many of the pioneers personally.

"They're real people with a passion who have created an industry from scratch. I don't know all the volume and value stats but it's a major New Zealand industry and, more importantly, I think the mussel farmer and the Greenshell mussel epitomize this country at its best."

There's been a focus on increased efficiency and supply, which is great for the restaurant industry," Dell said.

"You can't menu what you can't guarantee to provide. And that food safety thing again - I know New Zealand has invested hugely in that. I can trust the product. As a chef my prime responsibility – before I even start to create palate pleasure – is to make sure the food is plate-safe. So that means protecting my consumer, my employer brand, and my own reputation by serving safe food."

With any aquaculture product food safety is a potential issue and country of origin really matters, says Dell.

He points out that greenlipped mussels are also now grown in parts of Asia as well as New Zealand. Only New Zealand farms the *Perna canaliculus*, Southeast Asia farms the *Perna viridis* variety.

Dell vows to only source from New Zealand, especially when he opens his new seafood-theme restaurant venture in Singapore in January next year.



QUALITY FOCUSED: Innovative growing and harvesting techniques, coupled with state-of-the-art processing and packaging procedures, have shaped New Zealand's Greenshell industry. PHOTO: Absolute Foods Ltd

Best practice principles

Until the 1980s, production focused on supplying live mussels for the limited domestic market and dried mussel extract for use in nutritional supplements.

Midway through that decade, the product had a renaissance when half-shell frozen products were promoted as a gourmet food item targeted at global export markets.

Since then, the industry has worked hard to supply a large number of countries and now sells into 76 overseas markets.

The United States, Korea, Spain, the United Kingdom and Australia are now the top five markets for Greenshells, and Absolute Foods' Langridge explains that with increasing demand from emerging countries such as Russia, the industry has reduced reliance on any one market and is less susceptible to the influences of supply and demand and recessions.

"Mussel farmers have vastly stepped up every aspect of their operation with significant improvements to the longline technique, transfer of spat, growing strategies and harvesting methods. Innovative growing and harvesting techniques, coupled with state-of-the-art processing and packaging procedures have shaped New Zealand's Greenshell industry," Langridge said.

"Despite periods of adverse trading conditions for other species, the outlook for this industry is extremely positive based on global trends in demand for quality protein and increasing value being placed on sustainable farming practices and nutrition.

"Consumption patterns are changing as income-rich, time-poor and health-conscious consumers demand convenience, food safety, nutritional value, traceability and environmental sustainability. Even in the commodity market, the unique attributes of the Greenshell - exceptional water quality and food safety standards - have meant the industry continues to move to higher value segments within this market."

And yet according to industry body Aquaculture New Zealand, the industry has been caught in a "commodity cycle mentality" for several years, where supply has exceeded demand and has limited pricing points.

This year, with increased demand and some supply restric-

tions, the product has repositioned to what appears to be a fair and sustainable price point – a position most in the industry would seek to maintain rather than risk being removed from menus.

From an industry perspective, the main product form exported is IQF half-shell.

Approximately 80 percent of production is exported. The IQF half-shell has offered many functional benefits as well as providing sophisticated culinary options.

Langridge says consistent feedback from the market is that this product is user-friendly, offers consistent quality and captures a fresh taste.

"The popularity is increasing with emerging culinary trends. As an authentic finger food, New Zealand mussels have been suited to more adventurous customers seeking new taste experiences via appetisers, especially tapas, small plates and bar menus. The colourful shell adds extraordinary visual appeal to a plate. The mild flavour profile means versatility for menu op-



A CONSUMER FAVORITE: The Greenshell's high meat-to-shell ratio both enhances customers' value perception and requires fewer shells for an impressive display, reducing plate costs and increasing margins. PHOTO: Absolute Foods Ltd

portunities which allows for their application in a wide range of ethnic cuisines and modern cooking styles," Langridge said.

The New Zealand aquaculture sector has recently launched a Market Development Strategy driven by industry body representative Aquaculture New Zealand supported by New Zealand Trade & Enterprise.

This strategy will be focused on developing a better understand-

ing of the markets, who is eating New Zealand aquaculture products, as well as countries or consumer segments with potential for increase sales.

Efforts will be made to feature products using Greenshell mussel extracts and value-added products. A generic approach to profiling the many attributes of the New Zealand Greenshell will form significant part of the approach, Langridge said.

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Events calendar

January 23-25

35th Annual East Coast Commercial Fishermen's and Aquaculture Trade Exposition

Annual show held in at the Ocean City Convention Center, Ocean City, Maryland
Tel: +1 410 269 6622
Email: info@marylandwatermen.com
www.marylandwatermen.com/expo.htm

February 4

Salmon Show 2009

Norresundby, Denmark
Annual salmon processing show sponsored by processing giant Carnitech and held at its Denmark plant
Details: Carnitech Salmon Division
Tel: +45 9892 1511
Fax: +45 9892 1101
Email: salmonshow@ctsalmom.dk
www.carnitech.com

March 10-12

Frozen '09

Zaragoza, Spain
International frozen food exhibition held at the Zaragoza Fair Congress Centre
Details: Global Show Services, Area Portuaria de Bouzas, Oficina D, 9-10, 36208, Vigo, Spain
Tel: +34 986 48 8875
Fax: +34 986 24 6001
Email: info@globalss.es
www.frozen.es

March 25-29

Pesca Sur 2009

Concepcion, Chile
Fishing show that alternates years with Aqua Sur. Aquaculture will likely feature prominently at the show, however.
Details: TechnoPress SA, Centro de Eventos Sur Activo, Concepcion, Chile
Tel: +56 2 756 5402
Fax: +56 2 756 5450
Email: mpfernandez@aqua.cl
www.pescasur.cl

May 14-16

Fishing 2009

Glasgow, United Kingdom
Europe's largest annual commercial fishing exhibition. The aquaculture industry will also be represented, and the show will have numerous activities of interest to the fish farming sector.
Details: Karl Coppack
Tel: +44 (0)20 7017 4510
Email: karl.coppack@intrafish.com
www.fishingexpo.co.uk

May 25-27

Seafood 2009

Baku, Azerbaijan
The 2nd Caspian international seafood and fishery exhibition, held at the Heydar Aliyev Sport and Exhibition Complex, Baku
Details: Maya Kafarli, project manager
Tel: +994 12 447 4774 Fax: +994 12 447 8998
Email: food@iteca.az
www.seafood.iteca.az/en/2009

June 16-18

Polfish

Gdansk, Poland
10th international fair of fish processing and fish products
Details: Monika Juskiewicz, Gdansk International Fair Company, 5 Beniowskiego Str, 80-382, Gdansk, Poland
Tel: +48 58 554 9362
Fax: +48 58 554 9117
Email: juskiewicz@mtgsa.com.pl
www.polfishfair.pl

November 12-14

Expo Pesca

Lima, Peru
Held every two years, this show brings together the South American aquaculture and fishing industries
Details: Thais Corporation, SAC, Tomasal 370, Monterrico, Lima 33, Peru
Tel: +51 1 344 4386 Fax: +51 1 344 4386
Email: thais@amauta.rcp.net.pe
www.thaiscorp.com/expopesca_new

August 14-17

Aquaculture Europe 2009

Trondheim, Norway
'New research frontiers: novel approaches for evolving needs' will be the theme at this year's annual European Aquaculture Society conference, held at the Norwegian University of Science and Technology
Details: European Aquaculture Society, Slijkensesteenweg 4, Oostende, Belgium, B-8400
Email: ae2009@aquaculture.cc
www.easonline.org

FAO: Aquaculture may not live up to expectations

The aquaculture industry has reached an important crossroads, with new challenges emerging regarding the sector's ability to meet future world demand for fish, says a report from U.N. Food and Agriculture Organization (FAO) researchers in Chile.

Small-scale farmers in developing countries are facing difficulties in exporting their produce, and need help to become competitive and access global markets, according to FAO.

In 2006, the world consumed 110.4 million metric tons of fish, with 51.7 million metric tons of that originating from aquaculture.

Production by traditional capture fisheries has reached a plateau, so to meet the projected demand for fish of an expanded world population, in 2030 aquaculture will need to produce an additional 28.8 million metric tons – 80.5 million metric tons overall -- each year just to maintain per capita fish consumption at current levels.

However FAO cautions in a paper to be presented this week to countries attending a meeting of the UN agency's Committee on Fisheries (COFI), Subcommittee on Aquaculture in Puerto Varas, Chile, from Oct. 6-10, a series of emerging challenges need to be addressed if aquaculture is to live up to its potential.

"The question remains whether the aquaculture sector can grow fast enough to sustain projected demand for fish while ensuring consumer protection, maintaining environmental integrity, and achieving social responsibility," the report said.

Already there are some signs that the sector's rapid growth over the last three decades is starting to slow. The sector sustained a yearly growth rate of 11.8 percent from 1985 to 1995. That slowed to 7.1 percent during the following decade, and to 6.1 percent for the 2004-2006 period.

Feed bottleneck

Most farmed fish that are consumed in the developing world, such as carps and tilapia, are herbivores or omnivores.

Species such as salmon or shrimp – often raised in developing countries and exported to wealthy consumer markets, providing jobs and income for millions of people -- need other fish, in the form of meal or oil, to eat.

In 2006 aquaculture consumed 3.06 million metric tons (56 percent) of world fishmeal production and 780,000 metric tons (87 percent) of total fish oil production. Over 50 percent of the sector's use of fish oil occurs on salmon farms.

Fishmeal and fish oil production has remained stagnant over



NOT SO FAST: Aquaculture is not the solution to all the world's problems, FAO says. PHOTO: ARE KVISTAD

the last decade, and significant increases in their production are not anticipated, according to FAO.

At the same time, the volume of fishmeal and fish oil used in formulated aquaculture feeds tripled between 1996 and 2006. This was made possible due to significant reduction of the poultry sector's reliance on fishmeal in poultry feeds.

"It is probable that the livestock and poultry sectors will continue to use less and less fishmeal in their feeds, which is good for the future of feed-based aquaculture," said Rohana Subasinghe, an FAO expert on fish farming and Secretary of the COFI Subcommittee.

"However, more and more formulated feeds are being used for non-filter feeding omnivorous fish like carps, thus the need for fishmeal is increasing. So we must make efficiency improvements in the use of feed and also some serious strides in terms of coming up with alternative protein supplements."

Small farmers at risk

Small-scale aquaculture farmers are benefiting from the \$79 billion (€57.7 billion) a year international trade in fish, although they face a number of challenges in doing so

FAO is seeing, for some commodities and in some producing countries, the overall number of fish farms is decreasing, while the size of individual farms is increasing, pointing to the concentration of fish farms into fewer hands.

"These trends need to be addressed, for example by establishing innovative producer networks so that small farmers can join forces, improve their operations, access markets, and remain competitive against bigger producers," said Subasinghe.

Other challenges highlighted by FAO's paper include the environmental impacts of fish farming, food safety and antibiotic use, and the impacts cli-

mate change may have on aquaculture.

Certification guidelines

One way to help aquaculture limit its environmental impacts and ensure it benefits small farmers to the maximum extent possible is to certify products so buyers and consumers can choose those produced in a sustainable, healthy, and socially responsible way.

The practice is being used in both capture fisheries and aquaculture with growing frequency, but is not without its problems.

As such programs proliferate, producers are struggling to meet the various standards being applied by different companies, countries or certifying organizations, which can differ significantly.

An overabundance of schemes increases the likelihood watered-down unreliable certification labels are used alongside credible ones.

To tackle these problems, FAO has been working with the Network of Aquaculture Centers in the Asia Pacific (NACA), holding consultations with various certification bodies, producer groups, processors and consumer organizations to draw up global guidelines on how aquaculture certification schemes ought to be established and applied.

A set of draft guidelines has been finalized and will be submitted to the COFI subcommittee this week for discussion and decision. The guidelines won't serve as certification standards in and of themselves but rather provide a common blueprint to ensure whoever is certifying farmed seafood -- be it a government, an NGO, or a private company -- is going about it in the same way, according to the same standards.

FAO has already developed similar guidelines for certification of fish products from marine and inland capture fisheries. *-IntraFish Media*