http://www.patagoniatimes.cl/content/view/596/1/

THE PATAGONIA TIMES

NEW SALMON RESEARCH CENTER OPENS IN CHILE

Written by Julie Sutor

Wednesday, 16 July 2008

Chile's first salmon research facility, near Puerto Montt.
Photo by Julie Sutor

Chile's salmon business has suffered under the effects of disease in recent months, but one company is on the hunt for solutions.

EWOS Innovations, the research arm of a Norway-based aquaculture giant Cermaq, just opened Chile's first state-of-the-art research facility near Puerto Montt.

"If you want to be a big player in the salmon industry, you have to do research," said Javier Gonzalez, general manager of EWOS Innovation Chile.

EWOS is the largest feed supplier to salmon aquaculture operations in the country. Cermaq, its parent company, also owns Mainstream, one of Chile's biggest producers of farmed salmon.

Researchers at the EWOS research center in Calbuco, southwest of Puerto Montt, are focused on developing salmon feed formulations that will boost the fish's immune resistance to parasites and disease – the biggest obstacles to Chile's once booming salmon industry.

The center also dedicates significant resources to replacing fish meal in salmon feed with other sources of animal and plant protein, in the face of declining stocks (and rising prices) of feed species.

Chile is the world's No. 2 producer of farmed salmon, right behind Norway. The sector raked in US$2.2 million in 2007, but this year's figures are likely to be less impressive, as farms have been plagued with sea lice and Infectious Salmon Anemia (ISA). The rapid spread of ISA through Chile's Regions X, XI and XII has forced many salmon farms closures, resulting in signficant layoffs (PT, July 15).

"If you ask me, the biggest problem for the industry is sea lice," Gonzalez said. "They create a lot of stress on the fish and suppress their immune systems. If we are able to control the sea lice, we solve a lot of the problem."

Sea lice are a proven ISA vector in Norway, and Gonzalez suspects the same to be true for Chile. Salmon farms have attempted to ward off the parasite with drugs, but have not succeeded well.

"We don't really have too many alternatives to the drugs we're using, so we're looking at how we can reduce infestation through the feed we use," Gonzalez said.

At the new research facility, researchers will examine how various feed formulations can boost the salmon's immune response, thereby interfering with sea lice reproduction and attachments. EWOS's focus is on natural compounds like herbal extracts. The facility is also well suited for such research, since Calbuco has experienced a very severe sea lice problem.

"We're very close to the commercial sites, so what happens to us happens to them," site manager Mauricio Gavilán said. "If new feed formulations are working here, we know they're going to be useful for everybody."

Chile's salmon industry has come under sharp criticism for its gung-ho quest for profits, often accused of ignoring environmental problems and long-term sustainability. In such an environment, EWOS Innovation's new center is a stand-out as Chile's only facility fully dedicated to research and development.

"As the only private company doing research in aquaculture, people come to us with a lot of new ideas," Gonzalez said. "Some of them are really interesting, and we're able to support that research."

By Julie Sutor (patagoniatimes@gmail.com)
Last Updated (Wednesday, 16 July 2008)

http://www.growfish.com.au/content.asp?ContentId=11827

Chile's SERNAPESCA expands ISA list, again

Benjamin Witte

Chile's National Fishing Service (SERNAPESCA) has added four new salmon farms to its list of official Infectious Salmon Anemia (ISA) "outbreak" sites. ISA is a highly contagious virus that can be lethal to fish but does not affect humans.

Over the past year the disease has spread gradually throughout southern Chile's salmon farming region.

The four new farms, all located in Region X, belong to Pacific Star, Invertec, Congelados Pacifico and Mainstream respectively. SERNAPESCA upgraded the farms from its list of "suspicious" sites, which currently contains 19 facilities – 16 in Region X and three in Region XI.

The outbreak list, which has included as many as 24 farms, now contains only 16 sites due to changes SERNAPESCA made to its cataloguing system. The fisheries body moved several of the farms formerly listed as outbreak sites to its newly created "temporarily decommissioned" list. The new category describes previously infected farms that have eliminated all fish, thoroughly disinfected all facilities and have agreed to remain inoperative for three months. The decommissioned list features 20 farms, 19 in Region X and one in Region XI.

In addition, SERNAPESCA maintains 47 sites under quarantine. Six of the farms are located in Region XI. The other 41 are in Region X.

SERNAPESCA recently confirmed the presence of ISA in far southern Region XII as well. So far, however, the government office has chosen not to include the site – a Marine Harvest reproduction center located near Puerto Natales – on any of its official lists.

That decision has angered Region XII activist groups such as the recently formed Patagonia without Salmon Farms Social Coordinating Committee (CSPSS), which fears SERNAPESCA is intentionally downplaying the area's ISA problem.

"It's strange that (SERNAPESCA) hasn't added it to the list," CSPSS representative Romano Totoro told the Patagonia Times. "It's SERNAPESCA's responsibility as an oversight body to publish this information. Yet so far they haven't done so. It seems they prefer to just cover it up."

The Puerto Natales-based CSPSS groups together representatives from the local tourism and artisan fishing industries, which are threatened by a pending influx of salmon companies seeking an alternative to the crowded and disease-ridden coastal waters of Region X. The organization has joined groups like Fundacion Terram, Oxfam Chile and the National Confederation of Artisan Fishers in calling for a moratorium on southward expansion of the salmon industry.

In Region XI, where the ISA problem appears to be growing, a group called the Association of Artisan Fishing Organizations has made similar demands. Once considered disease free, Region XI now figures quite prominently (12 farms) on SERNAPESCA's various ISA lists.

Salmon is huge business in Chile, where exports last year brought in more than US$2.2 billion. It has also – at last until 2007 – been an extremely fast growing industry. Between 2003 and 2006 exports increased by an average of 20 percent annually. During the span Chile solidified its place as the world's number two farmed salmon and trout producer, just behind Norway.

More recently, however, the industry has suffered a significant slowdown, due in no small part to problems with the ISA virus. In 2007 the industry grew by just 2 percent in terms of export sales. The dip has led to major job cuts in Regions X and XI, where more than 1,500 people have been laid off in recent months as companies like industry leader Marine Harvest continue to downsize their Chile operations.

The Chilean farmed salmon industry has also been hit by a fair amount of bad press this year. In March the influential New York Times published a scathing story entitled "Salmon Virus Indicts Chile's Fishing Methods." Not only did the article highlight the industry's current ISA woes, but it also raised serious questions about Chilean aquaculture practices, suggesting among other things that producers here use excessive quantities of antibiotics.

Just days after the article first appeared, Safeway, one of the largest food retailers in the United States, went public with a decision to reduce purchases of Chilean salmon. Overall, Chile sells approximately US$700 million worth of salmon annually to the United States. Safeway buys a relatively small portion of that: about US$12 million worth, all from Marine Harvest. Still, the move threatens to set a costly precedent, especially if other U.S. chains such as Wal-Mart or Costco follow suit http://www.sciencealert.com.au/news/20081707-17668.html

ScienceAlert
Australia & New Zealand

Gene test breeds pedigree abalone

Thursday, 17 July 2008

Fresh Science

Tim Lucas, growing abalone in the lab.

The world's fastest growing abalone—the tropical donkey's ear abalone, Haliotis asinina—can be bred to grow rapidly and reliably for aquaculture, Queensland biologists have found. And that makes it potentially a high value alternative crop for struggling prawn farmers.

The researchers looked at whether they could speed up breeding of abalone for aquaculture using modern technology to identify and select genes that are activated in fast-growing animals. By linking the abundance of specific genes with fast growth rates, they have now shown their proposal is practical.

"If we can select breeding individuals who grow rapidly, the chances are that they have the right underlying genetic instruction manual, which can be passed on, ensuring their progeny grow fast as well," says Tim Lucas from the Queensland Department of Primary Industries and Fisheries, who worked on the project with Prof Bernie Degnan of the University of Queensland.

The work has already demonstrated that growth rate is highly heritable—that fast-growing animals from the wild are likely to lead to fast-growing progeny in aquaculture. And the researchers have also developed methods for a simple blood test to measure the abundance of rapid-growth genes in wild abalone. This opens the possibility of pre-selecting fast-growing broodstock, reducing the level of undesirable genes from the start.

“Using these molecular techniques to select individuals for breeding rather than traditional physical traits, we can get one step closer to the fundamental genetic differences that control growth rate,” Tim says.

“It is difficult to go out onto the reef, tag and release abalone, and physically measure growth as it’s occurring. Using these molecular tools, however, we can take a blood sample and determine the activity of the growth genes. That immediately provides us with a snapshot of how fast individuals are growing at a particular point in time.”

The availability of these molecular tools increases the feasibility of farming donkey’s ear abalone in Australia, leading to rapid improvements in profitability.

“Not only are donkey’s ear abalone potentially of high value, but they are also plant-eaters,” Tim says. “This is important because it means they could provide a sustainable alternative option for tropical prawn farmers who are currently struggling to compete with cheaper imports and the soaring price of fishmeal.”

Because all abalone species are closely related and share most of their genes, says Degnan, it is likely the findings of the research team could also be applied to the more lucrative temperate abalone aquaculture industries in Australia and around the world.

Tim Lucas is one of 16 early-career scientists chosen for Fresh Science, a national program sponsored by the Federal and Victorian governments. He is presenting his research to the public for the first time.

http://myallcoast.yourguide.com.au/news/local/news/general/virus-impact-finally-recognised/811455.aspx

Fairfax Digital

Virus impact finally recognised

15/07/2008 1:16:00 PM

One of the objectives of the Pindimar Bundabah Community Association is to protect the flora and fauna that live in the pristine waters of Port Stephens for ourselves, visitors and future generations.

Consequently the association was successful in opposing the land-based development of an abalone farm on the sensitive and fragile foreshores of Port Stephens.

“In an article put out by the Department of Primary Industries the public is finally aware of the severity of this virus, which developed and escaped from a land-based abalone farm in Victoria,” Pindimar Bundabah Community Association publicity officer Peter Economos said.

Many kilometres of coastal waters were closed to abalone fishermen and it devastated the abalone industry and restricted marine activities in the southern coastal waters.

The NSW Department of Primary Industries has banned the use of abalone gut for bait or burley in all NSW waters after the incident in Victoria.

The virus can spread through the water column so infected bait does not need to come into direct contact with live abalone for the disease to be transferred. It affects the abalone’s nervous system causing swelling of the mouth, curling of the foot, weakness and eventually death.

“The association applauds the department for making the public aware of this virus even though it is around three years after its existence became known,” Mr Economos said.

The Pindimar Bundabah community was aware of the dangers involved in intensive land-based aquaculture on sensitive, estuary foreshore areas and therefore opposed the development.

Stirling's fish disease inhibitor works

July 15, 2008 - 1:03PM

Stirling Products Ltd says it has developed an inhibitor for Loma Gill Disease, a parasite that plagues farmed salmon and trout.

Stirling's beta glucan product, ProVale, inhibits the impact of Loma Microsporidial Gill Disease - or Loma salmonae - a costly and untreatable disease in farmed fish.

Dr Nicole Guselle presented results of the study into the disease at the 2008 Annual Meeting of the American Fisheries Society (FHS-AFS).

"At this time there are no therapeutic agents or vaccines available for use as treatments for the microsporidian, Loma salmonae," she said in a statement.

"When comparing the use of current unlicensed products to the use of Provale as a preventative agent for this infection in rainbow trout, Provale proved more effective."

ProVale is a highly purified, safe and natural immune-stimulating bioactive extract for use as a livestock or pet animal feed supplement.

Already on sale for use with poultry and swine in North America, it works by boosting the immune system against various bacterial and viral diseases.

Stirling said in a statement it is holding several discussions related to licensing and distribution agreements for ProVale.

Project leader Dr David Speare said the study was an exciting opportunity to evaluate ProVale.

"We have known that the cell mediated immune response of fish is critical for them to defend against microsporidial diseases; having a treatment that augments the immune response is therefore a very logical commercial approach for disease control."

World aquaculture has been growing at a rate of 8.8% per annum and over 60 million tons are produced per annum, equivalent to over US$70 billion.

Salmon fish farming, although only accounting for approximately two per cent of the total aquaculture farming, still represents over 1.4 million tonnes of salmon worth $US5.4 billion, produced each year, Sterling said.

Loma disease is recognised as one of the most economically significant diseases in farmed Pacific and Chinook salmon.

The FHS conference was held in Charlottetown, Prince Edward Island, Canada between 9th and 12th July.

http://www.nzherald.co.nz/category/story.cfm?c_id=16&objectid=10521554

Nelson scientists get $14.8m to expand shellfish industry

5:00AM Tuesday July 15, 2008
By Owen Hembry

The Cawthron Institute has won $14.8 million from the Government to look at expanding the aquaculture industry into higher value species such as scallops and flat oysters.

The Nelson institute has been involved in shellfish aquaculture for many years and has been given the funding over five years by the Foundation for Research, Science and Technology.

Cawthron chief executive Gillian Wratt said the money would be used to continue work on a programme of selective breeding and supply to farmers, plus look at the possibility of farming other higher value species such as scallops and flat oysters.

Shellfish aquaculture contributed about $256 million a year to the economy and was based largely on green shelled mussels, for which spat (baby mussels) were harvested from the wild.

"That's the equivalent to going back several hundreds of years or maybe even more than that in land cropping, thinking that you pick your seeds from the wild and then plant your crop."

Ms Wratt said the institute was already supplying material commercially to oyster farmers and was talking with mussel industry partners about the possibility of a commercial hatchery.

"The advantages of that are that you've got reliability of supply, you've got better uniformity in your production and in your quality ... we haven't yet but we could be breeding for specific end user requirements."

Farmers who tried the selectively bred spat experienced a 20 per cent rise in productivity in one generation, she said.

Crop & Food Research and Victoria University will be partners in the project.

http://aquaculture-center.com/2008/07/11/aquaculture-projects-at-australian-maritime-college/

Aquaculture Projects at Australian Maritime College

1. Value mapping of the marine environment to aid conservation and resource management

This project aims to assess and map the actual and perceived environmental, economic, social, and cultural values of the marine environment using both market and non-market valuation techniques. To aid in this, case studies in developing and developed countries will be evaluated to create and refine the value mapping methods. The resulting management tool will quantify and characterise marine ecosystem values to create a more holistic picture of the extent to which the marine environment benefits people and to define areas that are potentially at risk. The resulting GIS-based management tool will graphically display overlaying values to better inform decision-makers, especially within a marine biosecurity context.

Supervisors: Associate Professor Marnie Campbell (m.campbell@amc.edu.au)
Professor Chad Hewitt (c.hewitt@amc.edu.au)

2. Polyketide synthetase genes involved in ciguatoxin biosynthesis by the toxic dinoflagellate *Gambierdiscus toxicus*.

The tropical toxic dinoflagellate *Gambierdiscus toxicus* is the causative organism of ciguatera fish poisoning in tropical and warm-temperate coastal reefs. The neurotoxin involved in ciguatera is a large polycyclic compound called ciguatoxin (CTX) thought to be synthesized via a polyketide pathway. This project aims to use molecular approaches to isolate and characterise polyketide synthetase genes from *Gambierdiscus* and establish their potential role in neurotoxin production. The project is collaboration between UTAS, UWS and UNSW funded by and Australian Research Council discovery grant. The student will be based on the UTAS Launceston campus, but will spend blocks of time at UNSW during the first half of the project.

Supervisor: Dr Christopher Bolch (chris.bolch@utas.edu.au)

3. Chronic herbicide contamination in agricultural catchments as a factor stimulating toxic cyanobacterial blooms.

Despite strict guidelines controlling herbicide applications, many herbicides enter aquatic environments where they inhibit freshwater and marine algae at low effective concentrations. Preliminary evidence indicates that herbicide sensitivity of microalgae is highly variable among different groups and chronic contamination can shift algal communities to cyanobacterial dominance, promoting toxic blue-green algae blooms. This project aims to use laboratory and field experiments to determine the extent of algal growth inhibition caused by herbicides at differing light and temperature conditions, and examine potential synergistic effects of different herbicide/pesticide mixtures. The student will be based at UTAS Launceston campus and use Trevallyn Dam (and other South Esk reservoirs) as field sites.

Supervisor: Dr Christopher Bolch (chris.bolch@utas.edu.au)

4. Inheritance, segregation and expression of toxin genes in the toxic dinoflagellate *Gymnodinium catenatum*.

The widespread toxic dinoflagellate *Gymnodinium catenatum* is a common causative organism of paralytic shellfish poisoning (PSP). The PSP toxins are a suite of neurotoxins called saxitoxins (STX), also produced by a range of other dinoflagellates and some cyanobacteria. STX production by *G. catenatum* varies considerably with some strains being non-toxic and others producing a suite of 10-12 saxitoxins, yet we currently do not know how this variation is established and maintained. This project aims to use strain inter-breeding and molecular population genetics approaches to examine inheritance, linkage and expression of STX biosynthesis genes during the sexual life cycle of the dinoflagellate, to ultimately understand the factors that influence expression of STX synthesis by dinoflagellates. The student will be based on the UTAS Launceston campus.

Supervisor: Dr Christopher Bolch (chris.bolch@utas.edu.au)

5. Examination of the immune response of Atlantic salmon vaccinated with a DNA vaccine for amoebic gill disease (AGD)

Amoebic gill disease (AGD) remains the number one health problem of the Atlantic salmon Industry, costing c.a $20-25 million annually. Since 2002, CSIRO and UTas under the auspices of the Aquafin CRC, have been working with industry on the development of a DNA vaccine for AGD. Currently, the vaccine affords approximately 40% protection in an acute-to-morbidity challenge system. However, little is known about the mechanisms of protection. Recently the work has been funded for a further 4 years and is placed with the recently started Seafood CRC, with the expected outcome a commercial ready vaccine for AGD. Therefore we seek a suitably qualified, highly motivated student to undertake fundamental studies into the response of fish to the vaccine. This project will examine expression and translation of a 6 antigen AGD DNA vaccine, examine the humoral and cellular response to AGD vaccination, examine gene expression

following DNA vaccination and examine gene expression differences between vaccinated and unvaccinated Atlantic salmon challenged with AGD

Supervisors: Dr Phil Crosbie (Philip.Crosbie@utas.edu.au)
Assoc Prof Barbara Nowak (B.Nowak@utas.edu.au)
Dr Mathew Cook (CSIRO)

6. Mussel spat husbandry and biology

Continued, sustainable growth of mussel aquaculture world-wide depends upon the industry eliminating their reliance on collecting wild juveniles for on-growing. Hatchery-based juvenile production is currently plagued by unpredictable and unexplained high mortality. Using multi-factorial experiments, we aim to quantify the influence and temporal extent of key biological parameters influencing the growth and survival of the blue mussel across all phases of the life history, from egg-quality to settlement. An integrated understanding of juvenile growth and survival will allow development of rearing strategies to reduce the unpredictable and high juvenile mortality experienced during hatchery-based mussel culture. This project will assess the effects of the nutritional status of pre-settlement mussels on retention, growth, and survival of spat in land-based hatchery systems and identify biological and physical factors that affect spat settlement, retention, survival, and growth in land- and sea-based nursery systems

Supervisors: Assoc Prof Natalie Moltschaniwskyj (Natalie.Moltschaniwskyj@utas.edu.au)
Dr Christopher Bolch (chris.bolch@utas.edu.au)

7. Understanding the timing of reproduction in scallops: energy allocation and the influence of environmental parameters

Scallops show considerable variation in reproductive effort and low levels of population synchrony in spawning cycles. This project seeks to understand the drivers in the timing of reproductive activity at the level of individuals through determining and assessing sources and allocation of energy to reproductive and somatic growth. A range of environmental parameters will be explored and as a result the results of this project will implication to both wild fisheries and aquaculture.

Supervisors: Dr Jayson Semmens (Jayson.Semmens@utas.edu.au)
Assoc Prof Natalie Moltschaniwskyj (Natalie.Moltschaniwskyj@utas.edu.au)

8. Recruitment and retention of scallops in the D'entrecasteaux channel: is there a relationship with scallop density?

Recent literature has suggested the importance of maintaining high density regions of scallop beds as a source of recruitment. This correlation has, in part, been attributed to improved synchronisation of spawning events within high density regions. Given that scallops are broadcast spawners, releasing male and female gametes from the same individuals but at different times, such synchronisation of gonad development, and maintenance of high densities of adult scallops may be vital for the success of recruitment. The density of adult scallops on a bed may also influence the settlement of scallop spat and retention of recruits; however, there is little understanding of this relationship. The D'Entrecasteaux channel supports an important recreational scallop fishery; however, there is a concern that the beds in this region could be serially depleted if recruitment and retention is limited by recreational catch levels/patterns. This project will look at recruitment and retention of scallops in the Channel and determine if high density regions of scallops need to be maintained to promote these processes.

Supervisors: Dr Jayson Semmens (jayson.semmens@utas.edu.au)
Dr Jeremy Lyle (jeremy.lyle@utas.edu.au)
Dr Sean Tracey (sean.tracey@utas.edu.au)
Assoc Prof Natalie Moltschaniwskyj (Natalie.Moltschaniwskyj@utas.edu.au)

9. Development of an integrated and sustainable solution for management of industrial biofouling in a Southern-temperate estuary through improved understanding of local chemical and biological processes.

The zinc smelter in Hobart (Nyrstar) uses water from the Derwent Estuary to remove sulphur dioxide (SO2) from waste gases using a tail gas scrubbing system. However, although estuarine water is pumped through the system at relatively high flow rates (up to 4,500m3 per hour) it is still necessary to regularly deconstruct the system to remove excessive biofouling associated with blue mussel accumulation. To do this it is necessary to temporarily shut down various components of the scrubbing system. This results in a reduction in the SO2 removal capacity during these maintenance periods which in turn has the potential to increase the risk of SO2 emissions from the plant's foreshore stack. As a result, this PhD project proposes to examine various approaches for management of this biofouling problem and to determine the most effective and environmentally sustainable management strategy. Possible solutions to be considered include the use of biocides as well as more innovative approaches such as the redirection of the existing effluent stream from the tail gas scrubbing system back through the system. The expectation of such approach would be that the resultant reduction in pH would prevent biofouling in the intake lines (the effluent outflow currently varies between 2 and 6 pH units). However, to determine the efficacy of this approach a greater understanding of the effects of the effluent, and the associated reduction in pH, on mussel attachment and mortality is necessary. This project represents a unique opportunity to be involved in an innovative research project which will ultimately contribute to science-led management outcomes. The project will receive technical support from the Derwent Estuary Program and Nyrstar (Hobart) with an additional financial commitment (research funds) from Nyrstar.

Supervisors: Assoc Prof Natalie Moltschaniwskyj (Natalie.Moltschaniwskyj@utas.edu.au)
Dr Andrew Seen (A.J.Seen@utas.edu.au)
Dr Catriona Macleod (Catriona.Macleod@utas.edu.au)

10. Understanding quality in abalone

This project aims to develop a better understanding of the factors that define and influence quality for the species of abalone grown in Australia under local conditions. Specifically the project objectives will be to: undertake a desk-top survey on how markets discriminate and differentiate quality of abalone; examine seasonal and site difference in the concentrations of taste-active and quality-associated components in abalone; examine pre- and post-harvest factors on the quality of live and processed abalone; and test objective tools or instruments in the ability to measure or discriminate quality.

Supervisors: Dr Louise Ward (Louise.Ward@utas.edu.au)
Dr Malcolm Brown (Malcolm.Brown@csiro.au)
Assoc Prof Natalie Moltschaniwskyj (Natalie.Moltschaniwskyj@utas.edu.au)

11. Protein metabolism in barramundi (Lates calcarifer)

We are developing barramundi (Asian sea bass) as a model tropical species for the study of fish nutrition. It is a robust species, grows well over a wide range of environmental temperatures and has a globally expanding aquaculture. Protein metabolism is of fundamental importance and provides a mechanistic approach to exploring practical issues such as the replacement of high quality protein sources with sustainable alternatives such as plant proteins. In discussion with the successful applicant the PhD research would use our extensive experimental capacity related to amino acid metabolism, protein synthesis, gene expression and nutrition to explore critical issues related to ingredient use and diet development.

Supervisors: Prof Chris Carter (Chris.Carter@utas.edu.au)
Dr Robin Katersky (Robin.Katersky@utas.edu.au)
Dr Andrew Bridle Andrew.Bridle@utas.edu.au)

http://moora.yourguide.com.au/news/local/news/general/future-of-aquaculture-in-jurien-bay-bright/808748.aspx

FairfaxDigital

Future of aquaculture in Jurien Bay bright

10/07/2008 4:06:00 PM

WESTERN Kingfish's Jurien Bay based hatchery and offshore operations was officially opened last Friday.

Western Kingfish chairperson John Gillon said the facility would give hope to an industry facing a challenging future.

"The threat to global food supplies from over-fishing in open waters and especially in southern oceans has been well documented," he said.

"The development of a major facility at Jurien Bay by Western Kingfish is a significant investment in the under-developed commercial aquaculture industry in Australia."

"The completion of the hatchery and offshore operations in Jurien Bay is a significant milestone for Western Kingfish and ensures the company is on its way to becoming a major contributor to aquaculture in WA."

Western Kingfish has been working in conjunction with the Department of Fisheries and the Department of Environment and Conservation in developing environmental monitoring and management programs which will ensure that as Western Kingfish expands its operations, these aquaculture activities do not have negative environmental consequences.

Western Kingfish was formed at the end of 2006 and publicly listed on the Stock Exchange in July 2007.

The company has completed development of its aquaculture leases within the inshore waters of Jurien Bay with an initial goal of producing 2,000 tonnes of yellowtail kingfish per annum in due course while at the same time developing capacity to significantly increase production from deeper aquaculture leases further offshore.

Western Kingfish has recently successfully stocked one of its leases with 50,000 fingerlings.

"This location for our business is ideal," general manager and executive director Herb Mitton said.

"The water temperatures and high energy pristine environment are absolutely perfect for yellow tail kingfish, lobster and any number of high value temperate water species we may target.

"We are a rapidly growing sector of the food industry; therefore producing a premium quality product is the key goal.

"It is a goal that is made all the more achievable given that our product is raised and grown at a high quality site.

"We have established a first rate and fully functional hatchery facility and marine farm in record time and in so doing, have laid the foundations for WKL to build on.

"Western Kingfish has an aquaculture licence enabling it to undertake a full commercial venture."

This venture involves the culturing and selling of lobsters including Moreton Bay bugs, tropical rock lobster and western rock lobster.

The opening was officiated by the Fisheries Minister Jon Ford and included a visit to the Yellowtail Kingfish systems farm located eight kilometers south of Jurien and about two kilometers offshore within the Marine Park; a tour of both the hatchery and lobster holding and a seafood and local produce lunch prepared by Western Australian celebrity chefs Don Hancey and Peter Manifis.

http://www.abc.net.au/rural/news/content/200807/s2301102.htm

Rising demand for farmed salmon

Friday, 11/07/2008

Tasmania's salmon farmers are investing $23 million in two new hatcheries to meet growing demand.

Salmon farmer Tassal has announced plans for a $16 million hatchery, while Huon Aquaculture has just commissioned a $7 million plant near Huonville.

Peter Bender, from Huon Aquaculture, says its hatchery uses a new closed-loop water recirculation system, and will provide an additional one and a half million young salmon a year.

With annual growth 15 per cent, he says the industry is now a big contributot to the state economy.

"It would be well in excess of $300 million, which would put salmon probably as the biggest agribusiness sector in Tasmania."

http://www.norwaypost.no/cgi-bin/norwaypost/imaker?id=170323

The Norway Post
Doorway to Norway

New probems for aqua farmers

Norwegian aqua farmers are facing major losses due to the salmon diseases ILA and PD. The spread of disease has shown strong increase over the past six months.

/ np 09.07.2008 08:26

So far this year there are registered 16 utbreaks of ISA (infectious salmon anaemia) , and 62 cases of PD (pancreas disease).

For both it is twice as many cases as in all of 2007.

Neither ISA nor PD are dangerous for humans, but much of the fish dies when infected, and must be used for animal feed.

In addition it is also necessary to disinfect the nets, and often to replace equipment that is still in good order.

(NRK)

Rolleiv Solholm

http://environment.newscientist.com/channel/life/endangered-species/mg19926643.100-hormoneloaded-spearguns-make-captive-tuna-spawn.html

NewScientist Environment

Hormone-loaded spearguns make captive tuna spawn

- 09 July 2008
- From New Scientist Print Edition. Subscribe and get 4 free issues.

Bluefin tuna are among the most expensive fish on the planet. Just one can sell for more than $100,000 in Tokyo, where it is highly prized by top sushi chefs. But the taste for this luxury tuna in Japan has decimated global bluefin populations. In June the European Union ended the Mediterranean fishing season early, and US Atlantic stocks may be close to collapse.

But there is hope. Last week scientists used special spearguns to implant hormones into adult bluefin in sea-cages off Italy. Three days later they spawned, producing 10 million fertilised eggs in four days. "This is the first time anyone has got this amount of bluefin eggs," says Chris Bridges of Heinrich Heine University in Düsseldorf, Germany. "It's good news for tuna," as it may allow the big fish to be farmed.

Tuna boats already deliver live-caught bluefin to sea-cages for fattening, but this does not relieve the pressure on wild stocks. Raising bluefin on farms from eggs could help, though it may also cause ecological problems, such as pollution and disease.

Although Japanese scientists have managed to raise bluefin from eggs, the supply is unpredictable, as the adults spawn sporadically, and techniques used to induce spawing in smaller tuna species are unsuitable for 150-kilogram bluefin. This weekend's harvest of baby bluefin has been sent to aquaculture research institutes in Malta, France, Spain, Crete and Israel to see who can raise the most adults.

From issue 2664 of New Scientist magazine, 09 July 2008, page 7

http://thetyee.ca/News/2008/07/09/TaintedWater/

THE TYEE
A FEISTY ONE ONLINE

Tainted Water from UVic Fish Lab

On UVic campus, Microtek makes vaccines for fish farms, hatcheries.

Pathogens, chemicals, flowed out untreated. First of a three-part special report.

By Andrew MacLeod
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During the spring, large volumes of untreated water laced with fish diseases were travelling from a University of Victoria laboratory used by a private company through the city's sewerage system and into the ocean, a situation that caused alarm among some employees.

"This situation is not acceptable since untreated water with pathogens [is] going into the general sewer line instead of being treated by our system," wrote Ralph Scheurle, UVic's manager of animal care services, in a May e-mail to Dino Valeri, the school's manager of capital projects.

Also in the *Problems at UVic Fish Lab* series

- UVic Fish Lab Employees Raised Many Alarms
- about the *Problems at UVic Fish Lab* series

The problem was only the latest at the lab used by **Microtek Research and Development Ltd.**, a company that makes vaccines for the fish farming and hatchery industries. A UVic microbiology and biochemistry professor, William Kay, heads the company. Documents obtained by the Tyee trace a history of problems with the lab, and the frustration of the UVic employees who are supposed to make sure the facility follows health and safety rules and regulations.

The ongoing problems raise questions about the relationship the public university has with Microtek, whether it is subsidizing the company or stands to make money from it, and whether it has done enough to make sure the lab runs properly. They are key questions at a time when public institutions are increasingly turning to businesses to look for revenue beyond tuition fees and government grants.

"My understanding is as follows," wrote Scheurle in a May 6 e-mail to seven people, including UVic's director of research services **Rachael Scarth** and Microtek's vice-president of operations, Steve Carlos. "Under certain conditions the water which leaves the [pathology] labs (Microtek side) can leave the system WITHOUT any water treatment and enter the city sewer system. I concur with Mike [James, aquatic facility manager] that this is MAJOR concern and MUST be dealt with immediately."

Authorities not contacted

Despite the urgency of the e-mail, another document said Scheurle had known about the problem as early as Feb. 27, though he did not respond until reminded on April 24, nearly two months later. Nor does he appear to have acted on the problem until his May 6 e-mails.

At that time, Scheurle said UVic plumbers would add more piping to "increase the height of the overflow pipe" and a Microtek employee would reduce the volume of water going into the overflowing pump. Scheurle would consult an engineer and begin working on a long-term solution.

There is no indication in the documents, however, of any plans to contact the Capital Regional District, Environment Canada, the Department of Fisheries and Oceans, or any other authority that might be interested in bio-waste entering the CRD sewerage system and the ocean.

Scheurle is quoted in one summary telling facility staff not to contact the CRD. He did not return calls by press time. Nor did several other representatives of both the university and Microtek.

UVic's vice-president of research, Howard Brunt, who returned to the school in April 2007 after four years away, said the Vancouver Island Health Authority was brought in to investigate the problem with the treatment system because there were concerns the water was being re-used on campus for things like irrigation. VIHA's interest ended when it was found the water was not being used on campus and did not pose a public health risk, he said. He said he didn't know whether the CRD, DFO or Environment Canada were contacted once it was discovered the overflow was entering the region's system.

The documents fail to note exactly what diseases would have been in the water that was going into the CRD pipes. The regional government is moving ahead with plans to build an estimated $1.2 billion sewage treatment system -- despite lingering resistance from some **vocal opponents**, including several UVic professors -- but currently does nothing but run it through a screen before it enters the ocean. Besides fish diseases, the water from the UVic pathology lab likely also contained **formalin**, a parasite killing solution made from formaldehyde gas and commonly used in aquaculture.

Experiments with sea lice

Microtek is the largest user of the university aquatic facility. In November 2007, Microtek sent the university a list of 12 studies it was doing in the lab on campus. They included tests on tilapia and rainbow trout to study vaccines for several diseases. At other times, records show, the company was studying diseased Atlantic salmon. At least one experiment involved sea lice, a parasite some salmon researchers say likely spreads from fish farms to wild fish.

A DFO media contact said questions about fish viruses being discharged into the ocean should be directed to Environment Canada. An official from that ministry responded by e-mail to general questions about monitoring and enforcement by saying, "more info would be required on the discharge itself. You are going to have to be very specific." She did not respond to a second e-mail by press time.

Trevor Smyth, the supervisor of the CRD's source control program, which aims to prevent toxins and other hazardous waste from entering the system in the first place, said the **Sewer Use Bylaw** puts the onus on people or institutions to advise the CRD whenever something that shouldn't be there enters the pipes. "They should be advising us through an application form or at least a contact," he said. The CRD would then decide what to do.

The definition of "hazardous waste" included in the bylaw lists, among other things, "animal waste, untreated microbiology laboratory waste... and untreated human blood and body fluids known to contain viruses."

The bylaw allows for fines of up to $10,000 a day while a violation continues.

Smyth could not say whether UVic's fish facility is under investigation. "We're investigating lots of cases right now."

Tomorrow: Evidence that when problems grew at a UVic bio lab, administrators were slow to react.

http://www.patagoniatimes.cl/content/view/584/1/

NYT SOURCE BITES BACK, SLAMS CHILE'S SALMON INDUSTRY

Written by Benjamin Witte

Tuesday, 08 July 2008

Chilean salmon still under fire

Dr. Felipe Cabello Alleges Overuse Of Antibiotics In Chile

New York-based microbiologist Dr. Felipe Cabello this week offered a staunch defense of opinions he expressed earlier this year in the New York Times (NYT), which cited the scientist as saying salmon farms in Chile use excessive quantities of antibiotics.

In a letter addressed to Chilean Congressman Pablo Galilea Carrillo, president of the Chamber of Deputies' Fishing and Aquaculture Committee, Cabello repeated the accusation, this time offering damming evidence to back up his claim. Referencing a Universidad Austral de Chile study entitled "Diagnóstico del uso de fármacos y otros productos químicos en la acuicultura," the New York Medical College professor noted that in 2003, salmon farmers here used 134,163 kilograms of antibiotics to produce 280,481 tons of salmon, an average of 478 grams per kilogram of fish. That same year in Norway – the world's leading salmon producer – farmers used just 1.5 grams of antibiotics per kilogram of salmon. Chilean salmon producers, in other words, used a staggering 318 times more antibiotics than their Norwegian counterparts.

"The difference might be even greater, since according to the authors of the aforementioned study, responses to their surveys on antibiotic use were incomplete," wrote Cabello. "I believe this analysis shows that what I said in the New York Times is based on solid information that was scientifically gathered and documented."

The letter marked the first time Cabello has spoken out on the issue since the controversial NYT story first went to print. Entitled "Salmon Virus Indicts Chile's Fishing Methods," the March 27 article highlighted the industry's current struggles with Infectious Salmon Anemia (ISA) and raised serious questions about Chilean aquaculture practices. ISA is a highly contagious virus that can be lethal to fish but does not affect humans.

The scathing story put Chilean salmon producers and government representatives squarely on the defensive, especially when just days after publication the U.S. supermarket chain Safeway announced it would reduce purchases of Chilean raised salmon (PT, April 1). SalmonChile, the country's private producers association, characterized the article as an "attack" and even threatened to sue Cabello.

"We lament the fact that foreign media try to weaken Chile's third most important export industry, an industry that employs more than 50,000 people and that has played a key role in our national growth," said SalmonChile head César Barros.

Controversy over the article continued when, two months later, the NYT admitted it made a crucial reporting error while preparing the story (PT, May 13). The paper explained in a May 13 editor's note that Adolfo Flores, a man cited in the article as a top Castro (Chiloé) port official, is in fact a security officer and should not, therefore, have been used as a source. In the article Flores described bags of fish food in a Marine Harvest facility as containing antibiotics, pigments and hormones.

Barros and his colleagues applauded the partial retraction, saying it effectively withdrew the "principal accusations" included in the original article. This week, Undersecretary of Fishing Jorge Chocair also shed doubt on the NYT allegations in statements made before the Chamber's Fishing and Aquaculture Committee.

"It must be pointed out that when our products go to international markets they can't use the array of antibiotics mentioned in the New York Times because the export markets are very demanding. They test samples not just for antibiotics but also for the existence of other prohibited chemicals," said Chocair.

The problem with Chocair's claim, Dr. Cabello pointed out in his letter to Dep. Galilea, is that Chilean salmon in fact has tested positive for antibiotics and other chemicals. In 2006 the U.S. Food and Drug Administration detected oxolinic acid (an antibiotic) in Chilean salmon, Cabello explained. In October of last year Canadian authorities found a sample of Chilean salmon to contain the anti-parasite drug emamectin benzoate. In 2003 Chilean salmon tested positive in England for malachite green, an anti-fungal chemical. This list goes on.

The NYT's well-publicized reporting gaffe aside, insisted Cabello, overuse of antibiotics in Chile is very much a real

issue and one that must be both acknowledged and addressed.

“The gap that exists between declarations made by (government and industry) representatives and the reality as demonstrated by scientific research undermines the development and expansion of the industry,” wrote Cabello. “It’s impossible to manage a modern industry while ignoring reality, as negative and surprising as it may be.”

Industry critics insist that the antibiotics, which are contained within salmon feed, go not only to their intended targets – the farmed salmon – but make their way into the environment at large. Penned salmon eat only a portion of the food pellets given them. The remainder fall to the ocean floor, where they can be eaten by wild fish as well. A study carried out by the environmental NGO Oceana in a salmon farming area in southern Chile found that the meat of some wild fish samples (sea bass, whitecaps and wild trout) contained antibiotics used by the salmon industry.

“The letter sent by Dr. Cabello does nothing more than reaffirm what we have maintained over the years regarding health risks and the negative impact that excessive use of antibiotics has on the environment,” said Alex Muñoz, the executive director of Oceana South America.

“With all this evidence, the (Chilean) government cannot continue ignoring the urgency of drastically limiting the use of antibiotics by means of new regulation. We ask the Salmon Working Group coordinated by Felipe Sandoval to collect the available scientific evidence and to promote this necessary regulation,” he added.

The Chilean salmon industry, based primarily in Region X, is a US$2.2 billion-per-year industry known for its rapid growth. Between 2003 and 2006 exports increased by an average of 20 percent annually. During the span Chile solidified its place as the world’s number two farmed salmon and trout producer, just behind Norway. More recently, however, the industry has suffered a slowdown, due in no small part to problems with the ISA virus. More than 1,000 workers have lost their jobs in recent months as companies like industry leader Marine Harvest continue to downsize their Chile operations.

By Benjamin Witte (benwitte@santiagotimes.cl)

http://www.lexpress.mu/display_article.php?news_id=111201

lexpress.mu

The fishy side of the Finance Bill

The new legal framework surrounding aquaculture activities was debated in Parliament yesterday under the guise of the Finance Bill. Why does this industry create such controversy?

Mahebourg fish farm is the only off-shore farm. Six other sites have been identified by the ministry of Agro-industry.

"The Fisheries and Marine Resources Act 2007 is amended". Thus reads Section 11 of the Finance (Miscellaneous Provisions) Bill, which was debated in Parliament yesterday. Underneath this misleadingly innocuous title lurk ramifications of a very disturbing nature. Not only does this law have potentially deadly consequences for the country's marine biodiversity, but it could also radically change the Mauritian way of life. This is perhaps why the government has decided to surreptitiously insert the amendments to the Fisheries and Marine Resources (FMR) Act into the all-encompassing Finance Bill rather than amend the Act directly.

The changes to the FMR Act concern primarily fish-farming activities, which can be carried out either off-shore or in-shore. Two fish farms, the Mahebourg fish farm (off-shore) and the Val farms in St. Martin (on-shore), are currently in operation in Mauritius. The ministry of Agro-industry has identified six further sites for fish-farming. And although a total of 8 fish farms seems reasonable enough, the amendments to the FMR Act are nothing short of draconian and have prompted fears that they will open the way for many more projects, to the detriment of the country's human and fish populations.

In particular, the amendment to section 8D of the FMR Act is the polar opposite of the concept of "democratization of the economy that has been so successfully employed, as a carrot for some and a stick for others, by the current government." (1) The concessionaire of any area in a fish farming zone shall take such measures as may be necessary to ensure that the area is clearly and visibly marked-off in such a manner as may be approved by the Prime minister and that the marked-off area is properly maintained. (2) Every marked-off area shall be under the overall control and administration of the concessionaire."This amendment thus cedes absolute control of whole swathes of our lagoons to the "concessionaire".

This provision is disturbingly reminiscent of the controversy surrounding Ocean Blue Company's recent attempt to restrict to public access to the beaches of Ilot Gabriel. The Supreme Court issued an interlocutory injunction against the promoter, thus further entrenching the freedom of access to the "public domain". Some fear that it's only a question of time until a company with sufficient funds comes along and leases a whole lagoon thus rendering it off-limits to Mauritians.

Act like shark magnets

There is also a risk that the off-shore fish farms will impact negatively on Mauritius's reputation of being a high-end destination. These farms could, in effect, sully the "Mauritius experience" for many tourists who expect to find pristine lagoons, rather than floating cages and unpleasant smells. "You can't have your cake and eat it", comments Vassen Kauppaymuthoo, an oceanographer and president of NGO Kalypso.

But the cages could affect our enjoyment of the lagoon in other ways too. By concentrating high densities of fish into submerged nets, the farms act like shark magnets. In Hawaii, a rise in shark attacks has led many locals to demand a detailed study on the correlation between fish-farming and shark activity. The National Oceanic and Atmospheric Administration has confessed to increased shark activity around the farms it manages in the US.

Notwithstanding its impact on human activities, the ocean's top predator could also disrupt the food chains in our lagoons. However, this could prove to be fish farms' least harmful effect. "Mauritius possesses a unique marine biodiversity. Contrarily to its terrestrial biodiversity, which has been greatly destroyed by human activities and invasive species, marine species, such as the Mauritian clownfish and some unique types of coral, have adapted more or less well. Fish farms will have the same impact on the sea as human activity has had on land", warns Vassen Kauppaymuthoo.

He also warns against the possibility of genetically-modified fish, algae and the like escaping into the wild and vying for food with the weaker local species. An especially notorious incident occurred in the early 1980s when green algae escaped from the Oceanographic Museum of Monaco and gradually colonized the whole of the Mediterranean Sea. The authorities in Mauritius have always stringently enforced agricultural regulations to prevent the arrival of foreign plant species and diseases. It seems apposite that a similar stance be taken vis-à-vis our marine environment.

Moreover, cramming high densities of fish into relatively small spaces can give rise to epidemics that can spread to the wild fish population. To combat the risk of disease, fish feed is enriched with antibiotics and anti-parasitic substances, which can pollute the ecosystem and, paradoxically, lead to the proliferation of parasites in wild fish.

Competition for coastal services

In June 2000, the highly respected scientific journal Nature published a paper entitled, Effect of aquaculture on world fish supplies, which dispels the myth that aquaculture adds to overall fish stocks. "The diversity of production systems leads to an underlying paradox: aquaculture is a possible solution, but also a contributing factor, to the collapse of fisheries stocks worldwide. Ocean fisheries and aquaculture now share or compete for many coastal ecosystem services, including the provision of habitat and nursery areas, feed and seed (larvae) supplies, and the assimilation of waste products. As aquaculture production continues to increase and intensify, both its reliance and its impact on the ocean fisheries are likely to expand even further. The balance between farmed and wild-caught fish, as well as the total supply of fish available for human consumption, will depend on future aquaculture practices."

The world food crisis has precipitated the necessity to find new ways to feed the world's population. And aquaculture is undoubtedly one of the ways of achieving this. On-shore aquaculture, in particular, seems promising, as do integrated systems, which reduce effluents and diversify products. It seems vital however that all matters related to the industry be conducted in a consensual and transparent fashion. Amending the FMR Act via the Finance Bill certainly isn't the way of going about it.

Nicholas RAINER

http://www.abc.net.au/ra/innovations/stories/s2286394.htm

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Family Fish Farming

Cutting-edge salmon farming where research is turned into practical on-farm innovations

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TRANSCRIPT:

DESLEY BLANCH : Over the past 20 years innovation seems second nature to Peter and Frances Bender in running their family-owned Atlantic salmon fish farming business, Huon Aquaculture. Tucked away in southern Tasmania -Australia's island state--they operate nine sea farms at different locations on the Huon River and in the D'Entrecasteaux Channel.

Huon Aquaculture is Australia's second-largest producer of Atlantic salmon, supplying both national and international markets and leads the industry in research and development.

I caught up with Peter and Frances Bender at their recently opened seven-million dollar hatchery in the upper reaches of the Huon River, deep in the Huon Valley.

PETER BENDER : This is our new seven-million dollar recirculation hatchery that we built to house about one-and-a-half million salmon--young baby salmon.

FRANCES BENDER : It's a very grey cement building full of tanks.

PETER BENDER : The fish when they go to sea weigh about 120 grams, so they start off as an egg, and we hatch them out in our incubators and then they go into small tanks when they are just a few grams, and then as they grow we put them into larger tanks, about 50,000 per tank and then out into the tanks outside the building for final grow-out before they go to sea.

They are in different sized tanks. The small blue tanks down the end are the first ones they go into when they come out of the egg incubators and then as they grow, they go into these larger concrete tanks, and then to the even larger concrete tanks outside.

They are in the same amount of fish per tank as what they eventually go to in the sea cage when they go to sea.

DESLEY BLANCH : We've now moved into the centre of the building, and there's a long yellow pipe and I can see millions of fish swimming against a stream but they are inexorably being drawn elsewhere. What's going on?

FRANCES BENDER : Well, these small fish are being transferred from their larger tank and they are going along the pipe, as you said, furiously trying to go in the opposite direction. They are being pumped using a fish pump through a grader, through an automatic grading machine, where they are graded for size and they are also electronically counted.

DESLEY BLANCH : Now, where do they go from here, Peter?

PETER BENDER : The larger fish will go out to the outside tanks and the smaller ones will remain in here for a bit more on-growing. We basically have fish at all different stages in the hatchery, so we can be putting fish to sea over about a seven to eight month period and that way we've got harvest fish available all year round. We've got nine different sea farming sites in the Huon River and D'Entrecasteaux Channel.

We actually start the small fish further upstream and we tend to mimic what would happen to the fish in the wild. So when they first

go to sea, they are in what we call a brackish water site, which is mainly salt water with a layer of fresh water on the top and, then as they acclimatise to that, then we move them further down the river into more fully marine sites and then into our more exposed sites in the lower channel where it's fully marine and quite rough and exposed.

So the fish once they get down to there, they are about one-and-a-half kilos, and they tend to grow very quickly at those sites and they will stay there until they are ready to harvest at about four of five kilos.

DESLEY BLANCH : We then moved outside to find ten large cement tanks covered with black plastic. We scrambled up the ladder to look down on thousands of fish swimming endless circles.

PETER BENDER : Well, what happens out here is that in order to put fish to sea at different times and therefore spread our range of sizes and enable us to harvest all year round, we need to trick the fish into thinking its springtime at different times of the year. And the way we do that is basically through photo period control or the use of darkness and light at different times to make the fish go through an artificial winter and then an artificial spring.

We basically do that by covering the tanks and giving them a long dark period for several weeks and then we'll switch lights on and give them a much longer light period and then they think they have gone from winter to springtime even though it's actually autumn at the moment, so these fish will be ready to go to sea in about another couple of weeks and if it was left to normal natural conditions they would not be ready to go to sea until about September or October.

DESLEY BLANCH : Frances, if the fish are damaged in any way, what does that signal?

FRANCES BENDER : That's a signal of bad husbandry practices and bad management at the hatchery. It makes me feel very happy when I walk in here and I can see beautifully formed tails and fins, because the salmon if they are not being looked after correctly, if they are being underfed or they are stressed, they will start nipping at each other.

They can become cannibalistic and once they have damaged their fins and tails, that is then a deformity that will be carried through with them for the rest of their life. So that fish is then deemed to never be able to be a premium product, a premium A grade fish. So it's very, very important that the fish are well looked after and to enable us to get the premium quality out at the other end.

DESLEY BLANCH : This is one of how many tanks, Peter, because I understand there are 50,000 fish beneath my feet swimming vigorously in one direction?

PETER BENDER : Yeah, I think we've got ten of these larger tanks and we've got in the design of the hatchery, we've made it so that we can actually add on and put another group of even bigger tanks in and that will give us a capacity of about another million fish without having to add on to the other parts. We've made the hatching part and the fry part all big enough so that we just bring the fish through faster through each of the stages and we can actually add onto it later on and grow even more here.

The other advantage of the system here is that it's a fully recirculated system and that means we can get much better control of the water quality and the temperature. The temperature is actually the same all the time and that enables the fish to grow very quickly all year round.

DESLEY BLANCH : Key to the whole process is the water purification and treatment plant.

PETER BENDER : It's difficult in Tasmania in the summer time to find rivers that have sufficient water to sustain the volumes of fish that we are now growing. So, moving to a recirculation system has got the benefits of being able to have more unlimited production.

The water here is being treated through mechanical means, so it firstly goes through mechanical filters, which basically filter out any solid waste and then it goes through the biological treatments where there is bacteria growing on a medium, which then basically treats the rest of the water back to a clean state, much the same as where in certain places they will treat sewerage back to clean water, back to drinking water, so this is really doing the same thing.

There is a little bit of waste water gets pumped out. That goes to a treatment system and the waste water after it's gone through that treatment system and the solids removed from that, the waste water is actually pumped up to irrigation, so we don't put any of the effluent water back in the river and we're actually using bore water for the inlet water here, so we're not taking any of the water out of the river or putting any water back in.

So it's probably the most environmentally friendly hatchery that's ever been built in the world in that regard, because most of these hatcheries would still discharge their water into the river in overseas situations.

DESLEY BLANCH : Huon Aquaculture's fish farms were the first to implement underwater infra-red sensing technology to monitor fish feeding behaviour.

PETER BENDER : The feeding technology that we chose to use about 15 or 16 years ago I think has been one of the reasons for

the company's success.
Fish feed is about half of our production costs and getting the fish to grow well is really the key to success in growing salmon and keeping your cost down and quality high.

Basically how the system works is that we have infra-red sensors at about eight metres deep in each of the sea cages. Those sensors they are connected by a cable to a computer on the side of each cage and the sensors monitor any uneaten feed pellets that get down to that depth.

The nets are actually about 20 metres deep, but if the pellets are getting down to about eight metres it means the fish aren't as hungry as what they were, so the feeders will then turn down, and then if on the next spin of the feeder still detects pellets, they will then turn off and so that way we are actually getting as much feed into the fish as possible without any going down to the sea bed.

DESLEY BLANCH : This is the Aqua Smart Feeding System. It was designed here in Tasmania and developed and commercialised on your farms and it's now exported to major international Aquacultural operations.

And Peter, you have designed and constructed a fish race for minimal stress bathing and handling of fish. So where do you use the race in your production line?

PETER BENDER : We need to bathe the fish which sounds a bit odd that we have to bathe fish, but we have to put the fish that are growing in the sea water into a freshwater bath several times a year, up to six to eight times a year. And the reason for this is the fish get a gill parasite and the way of killing that parasite is to put the fish into freshwater, so the parasite will only live in sea water, whereas the fish are able to adapt both in sea water and freshwater.

So we needed to come up with a method of doing that reasonably stress free.

So we designed a machine that was a little bit like a cattle yard for fish. I was a cattle farmer before I was a salmon farmer and we designed basically a raceway that we can park next to a fish cage where we swim the fish into the raceway and we again use water current. We actually have pumps pumping water from the front of the race to the back of the race and that water current encourages the fish to swim into the race.

And then on the end of the race we have an elevator. The fish basically swim in, the elevator drops down and then they see an area to swim into that's got plenty of room and then the elevator lifts the fish up out of the water. They de-water -- the water drains through the floor of the elevator and then the elevator tilts and tips the fish into a cage that's filled with fresh water.

And this way, rather than using a fish pump as when the fish get bigger they don't really like going through the fish pumps as much. It's a bit more stressful on larger fish. They are only out of the water for a very short period of time, so it's very low stress.

DESLEY BLANCH : You have implemented the latest techniques which use light to enhance quality and growth.

PETER BENDER : We not only use light in the fresh water phase of the production, but we also use lights in the sea cage and that's to both promote growth and to prevent early maturation. By putting the fish to sea early, we can risk the fish going through a period of early maturation because we put the smolt into the sea cages at the wrong time of the year, if you like.

So by using lights on the fish, you can trick them into a different time of the year so that they can go past the period where they are going to mature; and we'll also get better growth rates because the fish naturally grow better in longer daylight. So we can achieve both objectives.

DESLEY BLANCH : And you've installed and refined a delivery stun harvest system to reduce the physical stress on the fish at harvest time. So how does that improve the fish quality?

PETER BENDER : We worked with again another local Australian company to try and come up with a way of harvesting the fish which is a much lower stress method. Again we use the fish's natural instincts to swim into a water current and we pump the fish into a box which has a water current in it and then the fish swim into that current where they slide down a slippery slide and come up against a gate and the fish then gets percussion stun on the head.

It's a machine a little bit like a nail gun, but it's just a hammer that hits them on the head, kills them brain dead instantly, and then they go through an automatic bleeding machine as well. So there's very low stress on the fish before they get killed and that prevents lactic acid building up in the flesh, which gives you firmer flesh fish and less gaping in the product.

DESLEY BLANCH : So is this what you believe sets your fish apart from competitors?

PETER BENDER : It's certainly one of the reasons. I think the fact that our fish are bigger and better conditioned and we take care in the way we harvest them and the way we process them. It all adds up; it's just attention to detail right from the hatchery right through to harvesting and processing and growing the fish.

DESLEY BLANCH : And speaking of processing, your company's producing a range of value-added products. So what do they include?

PETER BENDER : We value-add about 15 or 20 per cent of our fish into smoked products; cold smoked products, hot smoked products, various flavours of hot smoked. We make our own pates, caviar.

DESLEY BLANCH : Frances is sitting next to me and the pair of you, how did you start this business 20 years ago?

FRANCES BENDER : Initially, I think we started the business as a diversification to the family farming business--terrestrial farming business. Peter and I always are both very independent minded people and had an independent streak in us and we've wanted to do something and create something for ourselves. So we started the business within the family structure back in the mid 80s and then it's grown from there.

DESLEY BLANCH : How tough has it been on you and the family when you were starting up the business and you were getting it consolidated?

FRANCES BENDER : It was extremely difficult at times actually. It's not been without its challenges. There's been an enormous amount of personal financial risk. There's been an enormous amount of juggling, particularly I suppose, me being Mum and sort of what I needed to do for the business and the good of the business and my employees and also balancing that against family and family life and their requirements.

So it's been fairly challenging, but in saying that though, I've likened it to sort of living a life on a roller coaster. It has its highs and lows and sometimes they are a bit to close together.

DESLEY BLANCH : Well, you have more than 230 employees in Tasmania and another 130 in South Australia. What are your tips for success?

PETER BENDER : I think just to do whatever you're doing as well as you can. I think you can be successful in most industries, but you have got to be the best at doing it and that's what we try to be in salmon farming, is we try to do everything as well as we can and I think if you grow a good quality product, especially in Tasmania where Tasmania needs to be known for its quality. We can't produce anything in huge volumes in Tasmania, so we've really got to strive for that quality end of the market.

DESLEY BLANCH : Where are your international markets for Atlantic salmon?

PETER BENDER : Traditionally it's mainly in Japan. We send a bit of product to Japan each year, but we've also sent product to the US, France, Hong Kong, most of South East Asia. Exports probably account for five to ten per cent of our production, so most of it's sold within Australia, but we do export a bit.

DESLEY BLANCH : And I think "innovation" might be your middle name Peter, so what's next for the company?

PETER BENDER : We're actually in terms of the farming, we're looking at some more innovative ways of handling our bathing with probably doing it in vessels rather than with liners and we're also looking eventually building a new processing factory at Port Huon, where we can incorporate even more innovative equipment in the factory.

FRANCES BENDER : And on the other side of the business, we are spending an enormous amount of time and effort at the moment doing a rebranding of our product and the value-added range is going to be rebranded and repackaged with very innovative packaging, very eye-catching which should cement us in the premium end of the market. So that's a very interesting and exciting project that we are currently involved as well.

DESLEY BLANCH : Peter and Frances Bender with their methods for successful salmon farming in Tasmania's Huon Estuary since 1988.