

MAY/JUNE 2013

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AQUA CULTURE

A s i a P a c i f i c

Renaissance of Black Tiger
Shrimp in Malaysia

Successful Hatchery Business
in Phuket

Managing EMS in Vietnam

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From the editor

Sustainability gaining traction

In the eyes of any producer, being sustainable is usually tied to economic sustainability. Logically, no one would continue the business unless it is profitable. As societies and consumerism develop, sustainability moves to encompass the quality of the product, its safety and health benefits and environmental protection during its production. In the aquaculture industry, these additional demands on sustainability are now a prerequisite for access to major markets, especially those in Europe and the US.

The scope of sustainability covers multi-stakeholders that include producers, retailers, certification bodies, consumers and NGOs. Producers, especially in Asia, accustomed to a production driven business model perceive the demand for sustainability is propagated by NGOs for purely ensuring self-existence. NGOs claim to be both the spokesperson and educator of the consumer and yet sometimes add to the confusion rather than offer any solution. Retailers fighting for market share are unsure what their fickle minded consumers want. They tend to rely on certification bodies to guide them and act as the 'policeman' to weed out the irresponsible producers. Certification bodies have a huge responsibility on their hands to identify the facts and to be able to see the forest from the trees. Any certification will be testimony to sustainable production.

While we are on the right track, producers and retailers seem to have little say in this scenario today. As sustainability gains traction, producers need to realise that although it takes considerable expense to be certified, they should not expect premium prices for certified products - these are the new standards for aquaculture production. Retailers on the other hand, should also realise that they cannot expect producers to have a long list of certifications and expect reasonable prices. Prices will continue to be a question of demand and supply and like water, the market will find its own level.

In any industry, safety, security, health and environment will influence its sustainability. In aquaculture, we translate these as food safety, biosecurity to prevent disease, production fit for human consumption and reducing the impact of farming on the environment. These aspects are incorporated into standards, either those developed by public organisations or certification bodies. While the producer has to match requirements, some of these are not achievable in aquaculture enterprises, especially with small scale traditional farmers. Surely, it is not a one size fits all and there must be the distinction to allow for different farm practices.

Fortunately, we see that standards setting is now taking these needs into consideration. However, what is required is more participation from producers in standard-setting and how they can achieve certification. The MOU between the three certification bodies (GAA, ASC and GlobalGAP) which was announced at ESE 2013 to undertake joint auditing will assist producers in cases where there are demands for different certifications by different markets. This cuts down costs of auditing but not that of certification which is still retained by the respective bodies.

We are now hearing the voices of emerging markets with their demands for food safety, quality and sustainable production. The China Fisheries and Seafood Exhibition in 2012 saw the demands of middle class Chinese consumers passed on to retailers openly seeking products from outside China, while penalising local producers who do not meet their expectations. The social media is now very active in the dissemination of consumer references from the west to east and vice versa. For example, Japan's requirement for ethoxyquin monitoring for shrimp products in Vietnam and other countries has filtered to markets in Korea and in Europe that are now asking for information on their shrimp imports. It is good to know we are all working toward safe and sustainable standards for the consumer.

Zuridah Merican

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- We strive to be the beacon for the regional aquaculture industry.
- We will be the window to the world for Asia-Pacific aquaculture producers and a door to the market for international suppliers.
- We strive to be the forum for the development of self-regulation in the Industry.



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Into another year with EMS in Malaysia

An industry meeting in March reviewed the situation of limited operations in some farms, good performance in others and high prices from short supply in local markets.

The upward trend from 35,173 tonnes of marine shrimp in 2007 to 87,203 tonnes in 2010, comprising 69,084 tonnes of *Penaeus vannamei* was short lived when total production dropped to 67,473 tonnes in 2011, according to official statistics of the Department of Fisheries Malaysia (DOF). Early mortality syndrome/acute hepatopancreatic necrosis (EMS/AHPNS) was first reported in ponds in West Malaysia in November/December 2010, making it the third affected country after China (2009) and Vietnam (March 2010). In the case of *P. monodon*, production was already on the decline since 2007 from 23,737 tonnes to only 7,151 tonnes in 2011, as farms switched to vannamei shrimp and possibly due to poor supply of quality post larvae.

Year 2013 will be the third consecutive year of losses. In 2012, only 55,000 tonnes of marine shrimp were estimated and the same is expected in 2013. According to industry, a recovery is expected in a large farm but some areas will abstain from farming. The loss in production will be compensated by successful crops in a newer integrated farm. Currently, there are 7,576.7 ha of ponds in operation and DOF is concerned not only on losses in existing farms but also its plans to expand production to almost 214,000 tonnes by 2020 with the targeted development of 10,000 ha of ponds, including four new farms, two each in the peninsula and Sabah, covering 4,000 ha.

The current malaise was discussed during a national seminar attended by 350 stakeholders on March 19, organised by the DOF and the Malaysian Shrimp Industry Association. The aim was to raise awareness on the EMS situation in Malaysia as well as in the region. It was also to encourage more biosecurity measures to prevent the spread. Ahamad Sabki Mahmood, DOF director general said that the department would like this to be a forum where industry share their experiences and together with the authorities, assess the situation and develop strategies to overcome the syndrome. He added that unfortunately, the shrimp industry is now plagued by the double jeopardy of the US CVD (countervailing duties) petition and the reluctance of mandatory respondents to cooperate, which may bring down the competitiveness of Malaysian shrimp in US markets.

DOF's National Fish Health and Research Centre in Penang has been at the forefront of diagnostics and research in understanding the outbreaks of EMS in Malaysia. Dr Kua Beng Chu presented the chronology of outbreaks which started in December 2010 in Johor; by May 2012 outbreaks have been reported in Pahang, Perak, Penang and Kedah. In June and October 2012, outbreaks were reported in Sabah and Sarawak (East Malaysia), respectively. Kua said that AHPNS was confirmed by histology results in Pahang in May 2011 but the case in Sarawak remains unconfirmed as they have yet to look at the histological samples. Some examples of survival rates given by Kua in one farm were lows of 10-14% at 23 and 38 days of culture (DOC) at one farm and highs of 30-41% at another farm at DOC 29-38.

"Our research showed some associated factors of EMS/AHPNS outbreaks such as 80% of shrimp were under stress and high ammonia levels were found in affected ponds. In the Sabah case, histopathology confirmed low survival as EMS/AHPNS. However, we have yet to confirm whether the mortality at DOC 50 and slow growth with accumulation of bacteria in the hepatopancreas tubules are related to the syndrome as histopathology samples did not show the typical pathology for EMS/AHPNS," said Kua. "We have also concluded that EMS occurred as early



The team from DOF, from left, Johari Tim and Mohd Munir, with president of the Malaysia Shrimp Industry Association, Tuan Syed Omar and Yip Kam Toh, vice president, Asia Aquaculture.

as DOC11 based on two trials at site. The progress on gut smearing will continue and we will use the evaluations so far to develop a score-card for early detection of AHPNS at the farm."

Experiences with EMS

A presentation by Star Feedmills (M) Sdn Bhd, part of the Charoen Pokphand group and the largest integrator in Malaysia with hatchery, feed, farm and processing plants gave an insight into the pressure faced by farmers and hatchery and feed suppliers. Lee Low, vice president, said that the previous reaction of farmers to EMS was to change the post larvae source and also the type of feed. "But farmers still could not recover from EMS disease nor stop shrimp mortality. There has been a lot of inconsistencies, the same batch of fry succumbing and some not to EMS. In some areas, some farmers claim that monodon shrimp show less susceptibility to EMS as compared to vannamei shrimp."

Road to recovery

One of Malaysia's top shrimp integrators, Agrobrest in Pahang, is well known for its consistently high production yields. This 1,400 ha farm with 461 fully HDPE lined ponds started shrimp farming in 1998. In 1999, the farm was affected by white spot syndrome virus (WSSV) which was easily overcome with using chlorine gas for water treatment. N. Akazawa, managing director, presented his experience with EMS at the farm. The first signs occurred in early 2011 when shrimp (>10 g) from the same hatchery source died quickly in five ponds. However, infection in some ponds was not limited to small juveniles but also



Cause of EMS identified

After months of investigation by a research team led by Donald Lightner at the University of Arizona, the elusive pathogen causing early mortality syndrome (EMS), an emerging shrimp disease in Southeast Asia more technically known as acute hepatopancreatic necrosis syndrome (AHPNS), has been identified, according to a GAA press release (gaalliance.org). The researchers found that EMS is caused by a bacterial agent, which is transmitted orally, colonises the shrimp gastrointestinal tract and produces a toxin that causes tissue destruction and dysfunction of hepatopancreas. It does not affect humans.

Lightner's team identified the EMS/AHPNS pathogen as a unique strain of a relatively common bacterium, *Vibrio parahaemolyticus*, that is infected by a virus known as a phage, which causes it to release a potent toxin. A similar phenomenon occurs in the human disease cholera, where a phage makes the *Vibrio cholerae* bacterium capable of producing a toxin that causes cholera's life-threatening diarrhea. Research continues on the development of diagnostic tests for rapid detection of the EMS/AHPNS pathogen that will enable improved management of hatcheries and ponds, and help lead to a long-term solution for the disease. It will also enable a better evaluation of risks associated with importation of frozen shrimp or other products from countries affected by EMS.

Some countries have implemented policies that restrict the importation of frozen shrimp or other products from EMS-affected countries. Lightner said frozen shrimp likely pose a low risk for contamination of wild shrimp or the environment because EMS-infected shrimp are typically very small and do not enter international commerce. Also, his repeated attempts to transmit the disease using frozen tissue were unsuccessful.

In an effort to learn from past epidemics and improve future policy, the World Bank and the Responsible Aquaculture Foundation, a charitable education and training organisation founded by the Global Aquaculture Alliance, initiated a case study on EMS in Vietnam in July 2012. The aim was to investigate the introduction, transmission and impacts of EMS, and recommend management measures for the public and private sectors. The study team included Lightner, who with University of Arizona co-workers recently identified the EMS/AHPNS pathogen. At a panel discussion on EMS at the Global Aquaculture Alliance's GOAL 2012 meeting in October 2012, Lightner and Timothy Flegel, Centex Shrimp Thailand speculated that the elusive nature of the disease might be explained by a bacteriophage.



Seminar speakers, from left; Lee Low, Robins McIntosh, CPF, Thailand who presented on Marine Shrimp Broodstock Development and Management, Ismail Abu Hasan, deputy director-general, DOF, Eduardo M Leano, N. Akazawa, Dr Ngan Taw and Fatimah Ferdouse.

affected adult shrimp. Akazawa conducted the various PCR tests internally and externally but none were positive for the known viruses.

"At that time, EMS was not known. We were only aware of slow death syndrome which later became early mortality syndrome. In most cases, after 30-50 days, we experience high mortality, and within 24 hours there was a drastic drop in survival. In appearance, this was close to a virus infection. In my 15 years of farming experience, EMS is possibly the worst disaster in shrimp farming. Unfortunately, until today, we are not able to identify and confirm the main pathogen causing EMS"

"I used to get 15-20 tonnes/ha, with survival of more than 80% at DOC 80-100 days. With EMS in some ponds, the most is only 5 tonnes/ha less than DOC 80."

In his presentation, Akazawa listed the steps he is now taking to recover from this syndrome. He is investigating each culture related factor one by one, such as shrimp growth at the different stages, hepatopancreas condition, sterilization and water treatment methods, infections in post

larvae, toxins and pollution in the surrounding environment, data records and trends in algae populations and minimising sludge.

"Often, we have been advised to relook at the biosecurity within our pond areas which we are in total control. But I would like to say that biosecurity at the national level (district, state and federal) and sharing of information are critical. We can be bullish and focus on good farm management but there are things beyond our control such as bad practices in waste disposal, water discharge into the surrounding waters and movement of live shrimp."

Lee Low said that since October 2012, his company began to recommend solutions based on some trials and emulating culture technology and parameters at EMS-free ponds. Some actions recommended include polyculture of shrimp and saline tilapia fish or keeping saline tilapia fish in net hapas within the shrimp ponds. "We have also introduced protocols to increase the C:N ratio in ponds by adding a carbon source (such as molasses and rice bran) which will increase the brown colour in ponds or reduce the plankton density. We encouraged farmers to nurse the post larvae before stocking to grow-out pond and for this, we have developed some nursery culture protocols. We recommended that water pH should be kept within 7.3 – 7.8 by using fermented rice bran or molasses.

Short supply high prices

With shrimp in short supply and a strong local market for live and chilled shrimp, Malaysian producers have had the advantage of high ex-farm prices for some time. The relatively high prices also attract cross border imports of shrimp from Thailand and Medan, Indonesia. In March, prices were as high as MYR18/kg (USD5.9/kg) for size 70/kg in comparison with MYR16/kg (USD5.4/kg) during the same period in 2012. In April, this escalated to MYR 21/kg for size 70/kg (USD6.9/kg) which buyers said confirms the lack of supply from Thailand.

News in Brief

Philippines ban on live shrimp imports

The Department of Agriculture of the Philippines has ordered the suspension of processing and approval of all permits to import live shrimp and other crustaceans from Asian countries in the Bureau of Fisheries and Aquatic Resources' Fisheries Office Order No. 146, Series of 2013. This is to protect the Philippines shrimp industry from the risk of entry/introduction of disease pathogens causing early mortality syndrome (EMS)/acute hepatopancreatic necrosis syndrome (AHPNS) and infectious myonecrosis virus (IMNV) from the affected and neighboring countries. BFAR has identified affected countries as Thailand, Vietnam, Malaysia, China and Indonesia. It has also included Singapore, Myanmar, Brunei and Cambodia on its watch list. (abs-cbnnews.com).

South Korea to test for ethoxyquin in shrimp

In April, South Korea's Animal, Plant and Fisheries Quarantine and Inspection Agency (QIA) announced that it will test for ethoxyquin on frozen shrimp imported from Vietnam in 2013, with the permissible limit equivalent to Japan's standard at 0.01ppm. The added pressure Vietnam faces from South Korea is a result of similar measures imposed by Japan in May 2012. According to general secretary Truong Dinh Hoe of the Vietnam Association of Seafood Producers and Processors (VASEP), the decision to run tests was reached to avoid potential complications for South Korean firms that import and process Vietnamese shrimp, to be exported to the Japanese market. A steady market growth of shrimp exports to South Korea and Australia has been reported while exports to other major markets were on the decline.

Collaboration to increase efficiency

During the European Seafood Exposition in Brussels, the Global Aquaculture Alliance (GAA) signed a memorandum of understanding (MoU) with the Aquaculture Stewardship Council (ASC) and GLOBALGAP whereby the standards-setting organisations will work collaboratively to increase efficiency and reduce duplication in the auditing process. The three organisations agreed to explore ways to reduce duplication of effort for farms, processing plants, hatcheries

and feed mills that undertake certification by more than one of the three organizations' certification programs.

All three certification programs share common elements that address the key environmental and social impacts of aquaculture, yet currently audits for each set of standards is conducted separately. They recognize that by working together they can more effectively promote environmentally and socially responsible seafood farming and processing. The goal of this MoU is to make certification more accessible and create greater value to a greater number of farmers and processors. The MoU emphasises the individual certification programs that will continue to operate separately, and the integrity and transparency of the programs, not to be comprised by any cooperative action.

Expansion in the Philippines and Vietnam

Charoen Pokphand Group (CPF), under CP Vietnam Corporation (CPV), is investing USD 100 million in Vietnam for several of its core businesses including a shrimp-processing plant being constructed in Hue, Central Vietnam, which should be ready by mid-2013. The group also aims to invest USD 120 million over the next three years in the Philippines under CP Foods Philippines Corp (CPFP). They plan to expand their livestock and aquaculture operations in the Philippines as well as their shrimp hatcheries and fish culture operations in Luzon, Visayas and Mindanao. Vice chair of CPFP, Pinij Kungvankij, said, "We will be ahead when others decide to come to the Philippines" in reference to the 2015 Asean Economic Community integration.

World's largest farmed sea bass and sea bream producer

A merger between Athens-based companies Selonda Aquaculture and Dias Aquaculture, finalised in April, will lead to the group becoming the world's largest farmed sea bass and sea bream producer. Generating 40,000 tonnes of product valued at a rising EUR 250 million in revenue, the new company named Selonda Aquaculture S.A., will employ around 1,500 people. The board of directors will comprise seven members, four of whom will be suggested by Dias and three by Selonda.

Fatimah Ferdouse, Infofish, said that it is still a low season for shrimp production. "Supply has been short because of delayed harvest in Thailand, due to the outbreak of EMS disease and only 30% of volume is expected for the first harvest expected in June. The situation has not improved in Vietnam and Indian production will be lower than last year because of post larvae quality and a disease outbreak in Andhra Pradesh. In Orissa, only 30% of production has been forecasted. The international pricing has not followed rising ex-farm prices."

Her assessment of the shrimp trade in 2012 showed that in Japan, overall imports were 1.8% lower due to falling demand for raw frozen shrimp although the share of imports of processed shrimp increased to more than 26%. Imports from Malaysia declined 19%. Total US shrimp imports fell by 7.3%, compared with 2011. Although supplies increased from India by 36% and from Indonesia by 6% supplies from Malaysia declined by 20%. EU imports of frozen shrimp were 8% lower.

"Asian countries led by Korea and China will continue to absorb more shrimp imports. Shrimp imports into the Middle Eastern countries grew by 200% from 2000 to 2010. The fact is that there will be small



Fatimah Ferdouse with Dr Nyan Taw (centre) who presented on biofloc technology in Malaysia and Dr Fariduddin Othman, DOF

markets coming up in the developing world where domestic demand for fishery products including shrimp continues to grow. This will support the inter-regional fishery trade and imports into emerging markets."



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Winning formula in PL production

A vannamei shrimp hatchery group wins over markets and trust of consumers with quality post larvae.
By Soraphat Panakorn, Karunithi Muthusamy and Zuridah Merican

Initially set up in Chonburi Province in eastern Thailand, the Samaesan group of shrimp hatcheries is now known as Thai Pacific Aquaculture (TPA) and has its major facilities in Phuket Island, South Thailand. Owner and aquaculture entrepreneur Pongsan Sathitsilp or popularly known as Khun Tum has been in the industry for the past 25 years, 11 of which were in the hatchery business. At his office and hatchery in Rawai, Phuket, Khun Tum and his business associate Saksahakorn Khongsamut, who operates the IT group of farms in Phang-nga explained how they have managed to stay ahead in the farmed shrimp business in Thailand.

Choice of Phuket

Around Rawai Beach, the company now has separate maturation and rearing facilities. The total number is 17 comprising 4 maturation facilities and 13 hatcheries of various capacities. The move to the current location from Chonburi was because of water quality in this area. "Imagine the pristine water out there in the promontory close to the Andaman. We cannot ask for a better site, although the disadvantage is transportation. The water intake is 6 km away at sea," said Khun Tum.

Brood stock development

Thailand's shrimp hatcheries are limited to a few vannamei broodstock suppliers. These are Shrimp Improvement Systems in Florida, Kona Bay and Oceanic Institute (OI) in Hawaii. Imports from SIS facility in Singapore are not allowed. In addition, two feed companies, Charoen Pokphand (CP) and Gold Coin (formerly Syaqua) supply farmers with post larvae from brood stock from their family based selection programs. Unfortunately for hatcheries, prices of brood stock from Florida have been increasing and currently cost more than THB 2,000/shrimp (USD 80/shrimp).

Some three years ago, TPA entered into an agreement with OI on a breeding program. Now that the agreement has terminated, Khun Tum plans to use the brood stock to carry out his own selection program. It was not clear whether this will be a family or mass selection program but Khun Tum says, "We would like to see the brood stock adapted to local conditions and tolerant to our farming conditions but having good growth too. Now this is at the experimental stage and soon we can launch this into the open market."

Meeting demand

"In the farmers' minds, the notion of specific pathogen free (SPF) post larvae is important. As we keep the brood stock in controlled conditions, they are SPF. However, post larvae are also SPF which is achieved with a high level of biosecurity. In the pond environment, things can be different."

The hatchery group requires the brood stock to be in a standard condition prior to use. Khun Tum emphasised the importance of having the brood stock adapt to the situation. If this is not achieved, then the hatchery will face problems down the line. Smaller brood stock are reared longer to reach the right size. The performance target is related to age/weight of the brood stock. This is less than 200,000 eggs for 50g brood stock and more than 300,000 eggs when the brood stock is more than 60g. Survival from egg to post larvae (PL10) is usually 80%.

"This is the way we manage output from the brood stock. However, each hatchery may need to fully understand this and make the necessary adjustments to pass their own quality control. Some may focus more on post larval quality, and others on high survival rates."

Given the rising demand for post larvae, how does Khun Tum manage to keep up? According to him, present production is only 60% of current capacity, while in their planning, the company is ready for an upscale of capacity by three times.

Thailand's demand is expected to be 60 billion PL10 annually. Peak demand periods are in March, followed by July/August. The operations of the hatcheries in the southern provinces are continuous, whereas those in the eastern provinces have a rest cycle during November and December.

"However, I expect that demand in the following years to remain the same. If there is a need for more post larvae, I may reject orders as quality is very important for me. We are in the top five in Thailand's shrimp hatchery sector. We sell our shrimp at 7 satang each (USD 2.3/1,000PL) whereas others sell at higher prices. We estimate that in the market today, the highest price is 15 satang each (USD 5.1/1000PL) and the second highest at 10 satang each (USD 3.4/1000PL). Our post larvae is recognised for its quality because of genetics and systems

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Shrimp of 16 g in 110 days in the feed tray. At the IT farm, the feed tray is observed daily when the weather is cooler.

used. Genetics is one thing and I have 13 years of investments to improve the systems to produce good quality post larvae."

At the Suratthani Shrimp Farmers meeting in February, experts and leaders in Thailand's shrimp industry made a call to hatchery producers to improve PL quality prior to selling to farmers. This may mean that smaller producers or producers of doubtful quality will lose market share. Khun Tum's comment was, "I agree with the idea that post larvae could be the reason for cases of early mortality, but I also believe that managing the environment well is important."

QC on post larvae

Quality control falls under the responsibility of marketing manager, Yongyut Jaisa-ard and involves checks on the quality of tank water, and complete development of the shrimp and pathogenic adhesions on post larvae. The hatchery group does not sell post larvae less than 11 days old (PL11) as they have found that the hepatopancreas and gill structures are underdeveloped. They also use the criteria of weight. The weight of PL 8 will be 672-675 PL/g, while PL11 will be more than 465-437 PL/g.

Yongyut's role is also to visit customer ponds to analyse post larvae performance in these farms. He reported that at stocking of 70 PL/m², at 45 days of culture (45 DOC), shrimp size was 133 pcs/kg. But when farmers increase stocking density to 140-150 PL/m², the size would be 200 pcs/kg at the same DOC. This will depend on the season, such as in February which would be winter, where survival was 70%. In comparison, it would be 80% for the rest of the year.

"With social media, news spreads very fast and so we have to be careful. However, good publicity also helps such as when all 100 ponds in a farm in Rayong showed good results," said Yongyut.

Liaison with farms

TPA works closely with a cooperative group of farmers, led by Saksahakorn Khongsamut, owner and manager of the IT farm group which has 30 ponds in two farms located in Phang-nga province. Together, the group is using their purchasing power to search for suppliers of the best quality post larvae. They have identified the TPA group as meeting their requirements.

Saksahakorn said during the last five years, farmers have been adopting various management styles. "Culture technology has changed with the use of autofeeders and at least 2 types of aeration systems. For example at the IT farm in Kokkloy, Leamhin, Phang-nga, ponds will have a mixture of long arm paddle wheels, comprising those with high rpm (160 rpm) to aerate water, and lower rpm (80 rpm) to push water around. These are not run together all the time. The sequence of running these paddle wheels will be determined by pond conditions.

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Khun Tum (right) with Yongyut Jaisa-ard (left) and Saksahakorn Khongsamut (second right). Co author Soraphat is second from left.

In the IT farm, a new disease prevention technique is to disinfect the pond water 3 to 4 times during culture. The purpose is to minimize pathogens in the culture water. A noticeable feature in the farm was that there were 2 to 3 feeding trays, aptly named ICU Trays, hanging off floats at the sludge margin area. This sludge margin area refers to the area between the feeding area and sludge area, with a width of 1 to 3m (Diagram 1). Saksahakorn mentioned that moulting shrimp and weak shrimp tend to congregate around this sludge margin area to avoid being with the stronger shrimps at the feeding area. For laboratory analysis technicians will collect shrimp from these sludge margin areas. A few hours before collecting shrimp samples they will mix vitamin C and mineral supplements with feed attractants to attract the weak shrimp to the ICU Tray. The dissolved oxygen (DO) in this area should be more than 4 ppm because the moulting shrimps require high DO for a quick and complete moulting process. It is the long arm aerator which can provide a uniform dispersal of DO throughout the pond area.

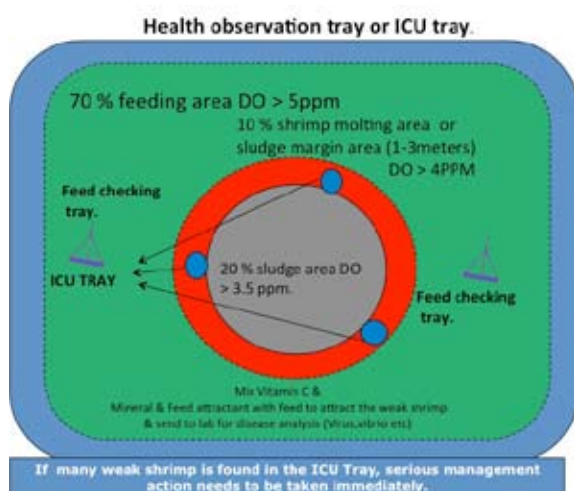
"We have also noticed that shrimp stocked at 220-250 PL/m² grow to size 200 pcs /kg after DOC 60. Some farmers used to harvest size 80 pcs /kg at a stocking density of 95 PL/m² at DOC 60 but now growth is slower to only size 100 pcs /kg after the same DOC. I noticed that farms which began with high stocking densities find that they have the same production problems when they reduce stocking densities, whereas those that started at low stocking densities have managed to maintain production consistently. Thus, we see that the trend is to reduce stocking density, some to as low as 50-70 PL/m². This may be ideal if we need to be sustainable. Some ponds which are fully lined have problems with toxic gases and are now removing the liners or inserting outlet pipes to siphon out gases.

"Climate change is more evident too. In my case, the water quality in Phang-nga Bay has deteriorated by 30%. pH is now 7.5 from pH 8."



Two types of aeration in ponds at the IT farm in Phang-nga.

Diagram 1. ICU Tray at sludge margin area



Soraphat Panakorn

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Karunanithi Muthusamy

Karunanithi Muthusamy is technical support manager at Syndel Asia, Malaysia. He has over 25 years of experience in farming and technical support for farmers in Malaysia, Indonesia and Papua New Guinea. Email: karu@syndelasia.com

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Some success stories in Vietnam

By Soraphat Panakorn

How some shrimp farms in Vietnam are overcoming the EMS in Vietnam.

This year, it will be two years since early mortality syndrome/acute hepatopancreatic necrosis (EMS/AHPNS) was first reported in shrimp farms in Vietnam. It started in the Mekong Delta in farms culturing mainly the black tiger shrimp *Penaeus monodon* which contributed more than 60% of shrimp production in the country. EMS gradually spread to many farms all over the entire country, bringing fear among farmers in the country. Today, farmers are putting all their efforts to overcome EMS.

Recently, I had the opportunity to visit many farms along the coastline of Vietnam from Cam Ranh to Ho Chi Minh City. Usually, during March, over 50% of ponds in the shrimp farming areas would have been stocked. This was not the case this year as most ponds are still empty and about 30% were still in the preparatory stage. Since 2011, the provincial fishery officials have instructed that farmers stock after April, to avoid EMS. Most farmers will follow but others have given up hope. They no longer have sufficient funds to restock their ponds after experiencing several crop losses. I compared this situation with the initiatives in Thailand. While in Thailand, we have launched a campaign on post larvae quality, the same is not being considered by the Vietnamese government.

During my trip, I talked to some farmers who have managed to continue farming and are harvesting shrimp of good sizes such as at size 40/kg. This was in spite of stocking during the critical periods such as during December 2012. I have estimated that now among 100 farmers, only 3-5 farmers have actually managed to farm shrimp continuously without any losses from EMS. Following a visit to five farms recently, I have discussed and obtained some ideas on how they have managed to overcome EMS. In general, their practices are quite similar to that of Thailand. They focus on post larvae quality, feed management and aeration.

Post larvae quality

Usually it is not easy to select post larvae but the successful farmers have the same advantage; they either have their own hatchery or a reliable source of quality post larvae. Farmer Toan, has his own hatchery. He will continue to rear post larvae up to PL20 to stock his own ponds. During this time, he uses the best quality feed such as Artemia with enrichment diets. In contrast, Vinh has a close relationship with a hatchery owner and is able to select a good batch by tracking the growth history in the hatchery. Another three farmers have their own ways to secure good quality post larvae.



Nursing pond

Nursing to post larvae

With the exception of Toan, all the four other farmers have their own nursing unit, most of them nurse post larvae at a density of around 1,500-2,000 PL/m² for the first stage in a nursing unit. When shrimp is bigger at size 500/kg or based on water quality, they will transfer shrimp to a pond. Again, when the shrimp reach size of 200/kg or when the water quality deteriorates, shrimp are transferred again to another pond. This continues until shrimp reaches size 100/kg, when they start partial harvesting to reduce the biomass and hence prevent the pond from exceeding the carrying capacity.

How do they judge when to transfer or start partial harvesting? All five farmers have different ways. Sometimes this is based on water colour, dissolved oxygen concentration or average daily growth (ADG). The key factor is management on demand with careful monitoring.

Feed management and pond additives

The other common link among all five farmers is feed management. All follow strictly feeding on demand protocols. They adjust the amount of feed according to weather conditions, shrimp behaviour, environment, water colour and temperature. The use of pond additives is common in Vietnam's shrimp farming industry. However, today the farmers use them carefully. They now follow the right dosage, time and usage instructions. This raised the production cost to almost



Successful farmers, from left, Khoa, Phi and Kha



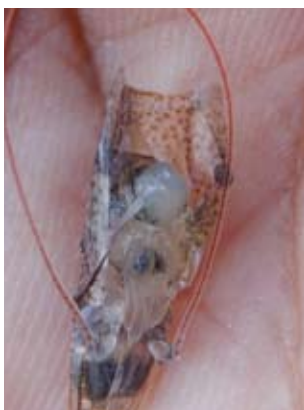
A successful farm with ponds covered with a green plastic



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Shrimp with hepatopancreas destroyed

USD 4/kg. "The culture situation has absolutely changed. We have to do our best and understand that a high investment cost for the right product which really works is actually cheaper than a low cost investment on products with unknown performance results," said a farmer.

Previously, although products carry instructions on how to use them effectively, few farmers follow them. Some of these instructions are for the following products: Iodine must be stored away from light;

vitamin C should be added quickly and also used as fast as possible; microorganisms need a balance of C:N ratio and alkalinity of over 80 ppm; chlorination must be applied at low pH and insecticide must be used under higher pH.

The right dosage has always been neglected by the farmers because they never take into consideration the pond size to calculate the exact water volume. Often, there is a worry of costs and farmers merely want to under-dose to save costs. Most farmers are not aware that they need to take into consideration many parameters (such as organic matter content in the water, pH, alkalinity, salinity, water transparency) before they use a product in their culture system. Only the successful farmers actually pay full attention to these details. Attention to aeration is another change which we see in the successful farms.

Failures

Among the 21 farms visited, there were 2 farms facing problems. Although they are careful with PL selection, they overstocked in the first nursing pond, up to 3,000 PL/m². This is a mistake because the farmer plans to transfer the shrimp to grow-out ponds when shrimp size is 3g at around 35 days of culture (DOC). The total biomass at maximum size in this pond can be up to 10 kg/m², this is too high to load even at a maximum carrying capacity. Generally carrying capacity in the commercial pond should not be more than 2.5 kg/tonne of water.

Another farmer stocked 500 PL/m² but is using the same aeration protocol as in a normal grow out pond with only 12 HP. He also expects

to transfer shrimp at 40 DOC when the shrimp weight average around 4g and his pond area is 5,000 m². When extrapolated, this means a total stocking of 2.5 million PL. When shrimp reach size about 4 g the total biomass will be 10 tonnes! Since one HP can support about 400 kg of shrimp biomass, this pond aeration system should accept only a biomass of 5 tonnes only. Here the limiting factor is aeration.

In conclusion, we can see that the working techniques to avoid EMS in Vietnam are as follows:

- A strict implementation of post larvae selection, i.e. to select only high quality post larvae and reject all sub-standard quality post larvae.
- Nurse post larvae before stocking with enrichment diets
- Apply feed on demand management
- Supply high levels of aeration
- Use only quality products with right dosage, techniques and time.
- Carrying capacity, i.e. stock below carrying capacity, the optimum carrying capacity should be around 1.5 kg biomass of shrimp/m³

For the moment, these guidelines should be used. It is also important to be open, to learn and share with each other.



Farmers May (left) and Vinh



Farmer Toan (middle) is all smiles

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Tilapia in Thailand: Fish health and controlling *Streptococcus*

Vaccination, as part of a complimentary health management program, is helping with production management in Brazilian tilapia and Chilean salmon farms. Best practices such as these will ultimately help with the long term profitability and sustainability of the industry in Thailand and the rest of Asia.

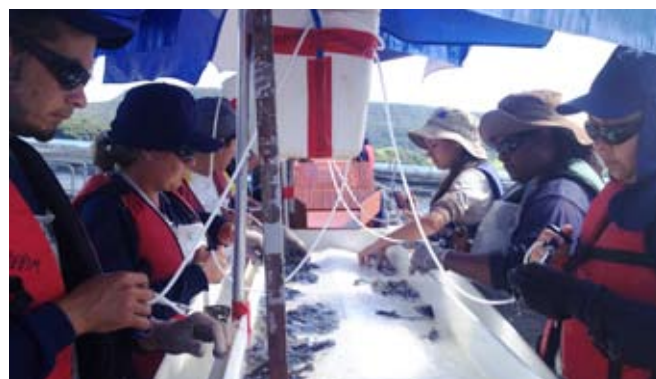
Local tilapia producers in Thailand as well as invited guests from the region were privy to a half-day educational symposium on 'Strep Control: Your Tilapia Health', organised by MSD Animal Health in Bangkok on March 12. The aim, according to **Robin Wardle**, Global Strategic marketing director, Aquaculture, was to increase the awareness of good fish health management to have a sustainable and profitable growth in tilapia operations. It was held prior to Aquatic Asia/VIV Asia 2013, and attendees of the symposium learned about the vaccine development life-cycle, appropriate and effective use of vaccines as part of the disease management protocol, and best practices from peers around the world.

"Asia accounts for 70% of all fish production in the world. It is important that fish farmers have a strong understanding of the best way to manage the health of their fish. MSD Animal Health identified an increasing need to provide additional technical and health education assistance in this region, and this meeting was the perfect opportunity to bring fish farmers and experts together. In 2008, MSD developed the first tilapia vaccine which to date has been registered in Indonesia, Brazil and Singapore," said Wardle.

Vaccination programs

"Diseases, such as *Streptococcus*, have a significant impact on fish production in Asia and other tilapia-producing countries. The key to disrupting the disease cycle in fish farms is to start with a good understanding of key diseases impacting production. Finding a vaccination solution for farmers is a challenging process that requires extensive research and testing, both in the laboratory and field," said **Siow Foong Chang**, R&D Lead, Singapore. MSD Animal Health has two dedicated innovation sites in Bergen, Norway and Singapore with teams and facilities to conduct work for the development of vaccines and medicines for the future.

Oscar Parra, Aquaculture Business unit manager, Chile, reported that vaccination programs in the Chilean salmon farming industry helped in the recovery of the industry after it collapsed in 2010. Centred in Puerto Montt, salmon farming expanded rapidly during the years from 2000 to 2006. Production jumped to 650 tonnes which then



The Brazilian tilapia vaccination team

fell to 300 tonnes in 2010. It recovered in 2012 with production back to 650 tonnes.

According to Parra, in the last decade, many different salmon diseases have become the major economic threat to the industry. Fish vaccines, among other complementary strategies, have played a relevant and decisive role in providing a sustainable method for disease control. In this regard, the infectious salmon anaemia (ISA) virus might be a good example of how vaccines and comprehensive vaccination programs helped to control a disease that caused a severe drop in the overall production volume.

Wardle said, "The core of the approach to health management in the salmon industry in Chile has been vaccination, with almost 90% of fish vaccinated. There are 52 vaccines available which are injectable and oral. In contrast, no fish goes out to sea without vaccination in Norway."

However, the importance of considering vaccination as a complementary disease management tool and not a magic tool that will provide total disease control was demonstrated in Chile, where farms changed their operations to all-in, all-out, stringent adherence to well boat tracks with rules for waste disposal and biosecurity and control programs to regulate disease. Vaccination does not prevent the disease but does enhance the ability of the population to deal with the problem."

Tilapia in Brazil

Rodrigo Zanolo, aquaculture marketing manager, Brazil, shared the experiences of farms in Brazil, which are starting to quickly adopt a total vaccination program. In Brazil, the current production is 160,000 tonnes with an annual growth rate of 10-15%. The production model is almost 90% intensive in small and large cages. The market is entirely domestic due to the strong local currency and demand. There is a large potential for expansion of tilapia for the 190 million population with a 9 kg per capita fish consumption and a developing middle class of 4 million people. Most of the final product is sold as fresh fillet, but 40% is still sold as whole fish. Some 60% of the tilapia is produced in the south of the country and 40% in the north.

"Production in the south is seasonal and this variation means we have temperature fluctuations from lows of 20°C to highs of 31°C. The major disease challenges are Columnaris, *Streptococcus* and



From Thailand's tilapia industry, Tavatchai Chidchomsrichantra (centre left) and Parinda Kamchum (centre right) with Waranjuta Santichartsak (left) and Chaiyakorn Promlee (right) from Pairat Farm in Chanthaburi, eastern Thailand.



Rodrigo Zanolo looking out at a typical medium scale tilapia farm in Brazil

Aeromonas. However *Streptococcus* remains the largest economical impediment to the sustainable growth of the industry, with 20-30% mortality in fish ranging from 40 to 800 g, but the greatest challenge is in larger fish. The market size is 850 g to 1 kg fish. The high temperature season poses significantly greater threat with regard to *Streptococcus*.

"Small cages from 18 m³ to 72 m³ produce 80 to 110 kg/m³ and large cages of 1,300 to 2,000 m³ cages produce 40 to 70 kg/m³. The two genetic strains are GIFT (70%) and Chitralada Thai strain. The cost of production is USD 1.20 to 1.50/kg whereas the ex-farm prices range from USD 2.00 to 2.50/kg. Brazil producers benefit from local supplies of corn and soy and feed conversion ratio (FCR) is 1.6 to 1.9. Currently, perhaps 80% of production is from small cages and we can expect more large cages with more investors in Brazil," said Zanolo.

"The company ran multiple disease investigations across the major producing regions. Of the 415 bacterial isolates of *Streptococcus*

isolated, 100% are classified as Biotype II serotype Ib. There are two distinct manifestations of the disease with clearly sub-clinical and clinical infections. Importantly, the sub clinically infected animals have an indirect but heavy impact on productivity. The first tilapia vaccine in Brazil, AQUAVAC ® Strep SA, was registered by MSD Animal Health in November 2011.

"The disease risk factors were listed as cages with fish above 40 g fish with high temperatures, high feeding rates at high temperatures and high densities. Survival was reported at 60-70% for 2 g to 50 g fish and 50-90% for 50 g to 900 g fish."

He added, "We conducted local field trials in both large and small cage systems to demonstrate the safety and efficacy of vaccination. Trained outsourced teams can vaccinate 780 fish/hour. With the temperature variations it has become important to adapt vaccination strategies accordingly. In the colder season, we vaccinate larger animals (40-70 g) to avoid the early opportunistic challenges such as *Columnaris* and fungal infections; however, in the warmer season, small fish (20-30 g) are vaccinated in order to provide protection earlier in the production cycle. Since then approximately 21 million fish have been vaccinated."

At a farm in Sao Paulo with 72m³ cages, faced with a strep challenge and outbreaks at the grow out stage, Zanolo said that they have vaccinated 100,000 fish at 48 g. The uniformity of vaccinated fish improved at all size range. At another farm, the mortality reduced from 3,500/month to 800/month when all the fish were vaccinated. They have presented productivity improvements. One farm started sparingly with 20% of stock vaccinated and moved to 100%.




Zanolo concluded, "Today, almost 60% of production in Brazil is from vaccinated stock. Uniformity, FCR and survival have now become key benefits for our customers. Although Brazil and Thailand are very distant, they share the same species and are both attacked by *Streptococcus*."

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Power of diagnostics

Unfortunately, there is a lack in veterinary health services and support for this industry and both **Parinda Kamchum**, aquaculture customer manager, Thailand, and **Norman Lim**, regional technical services manager, Asia, have identified this as an increasing need. They are now committed to provide this technical and health service for the industry. Parinda said that in the past 12 years, the R&D laboratory in Singapore has isolated, studied and understood many of the production diseases in warm water finfish aquaculture. At the moment, they have more than 2000 bacteria isolates and 20 viral cell lines and have developed diagnostic tools for these diseases.

The team in Singapore works with customers to understand the economic impacts of disease outbreaks in their farm. Using the laboratory in Singapore, they perform various diagnostic procedures such as bacteriology, virology, PCR and histopathology to identify the cause of the outbreak. With this information they can prevent future outbreaks by recommending approved treatment methods, improve husbandry protocols and biosecurity measures, and, finally, implementing vaccination programs to control diseases such as *Streptococcus*."

Power of immunity

According to **Neil Wendover**, aquaculture, warm water species technical services director, the goal is to achieve economical control of *Streptococcus* through the implementation of a mass vaccination program. If managed correctly, this control will lead to sustainable productivity and profitable growth for the operation.

"The key point that determines the success or failure of any commercial fish vaccination program is to focus on the fundamentals of building immunity. Vaccination is a hugely valuable tool because it harnesses the very biological power of the fish itself – the immune system. The problem however, is that the immune system is susceptible to a number of different factors including physiological, environmental, health and stress events and not just the vaccine itself. Hence, it is the management of these factors that determines the quality of the immune response and ultimately the level of disease control. In a fish farm, as is the same in a herd of cattle or an entire human population, the point is to consider and manage their immune response on an individual level as well as the production unit (pond or cage) as well as the entire population or 'herd'.

"On an individual level, there is a need to manage the health and stress status of the fish before, during and after vaccination and the importance of the vaccination procedure itself with the crucial factors to bear in mind. On a population or herd protection level, the need to align the husbandry management and overall structural organisation

of the farm as well as the timing and implementation of the vaccination program are also important.

"In conclusion the vaccine itself is not a silver bullet. It is the management of the vaccine and all that affects the immune system that will determine the success of the vaccination program."



The MSD Animal Health Team, from left, Robin Wardle, Chris Haacke, Global Marketing director, Norman Lim, Rodrigo Zanolo, Fabio Paganini, vice president Integrated Livestock Business Unit, Merck Animal Health, Neil Wendover and Siow Foong Chang

Moving Thai tilapia

Thailand is the fourth largest producer of tilapia. Except for a low production of 139,000 tonnes in 2011, production is on an upward trend and was at 178,000 tonnes in 2012. These statistics were presented by **Tavatchai Chidchomsrichantra**, general manager, Aquaculture Industry, KCF Processing and Marketing Co. Ltd. in his discussion on 'Local and International markets for Thai tilapia'. KCF is well known as a poultry layer company. It has just recently entered into the fish production and processing business through KFC Aqua Co. The annual production is 2,500 tonnes. The processing plant has a 15,000 tonne annual capacity.

With regards to Asian producers of tilapia, Tavatchai said that the other Asian producer active in international markets is China which produced 1.2 million tonnes and exported 258,000 tonnes in 2012 (21.5% of production). Malaysia is a small producer in terms of volume but has five large companies with exclusive rights to some dams.

"In 2013, I expect a production of 200,000 tonnes in Thailand and 240,000 tonnes if prices are good. Thailand's exports are small at only 10% of total production as local prices are good and 90% of production remains in Thailand. In future the target is to export 20% of production.

"However, Thai producers are challenged by the low international prices, initiated recently by China which dropped fillet prices to USD 1.90/lb. Locally producers can sell at ex-farm prices of THB 55/kg (USD 1.82/kg) for live fish and THB 50/kg (USD 1.70/kg) for chilled fish. This rises to THB 75/kg (USD 2.50/kg) in restaurants. The cost of production is around THB 32/kg (USD 1.10/kg) in ponds if pelleted feeds are used and THB 40/kg (USD 1.33/kg) with floating feeds. Our local market demands sizes of 600 g to 1 kg. Transport costs average THB 6.5/kg (USD 0.20/kg).



Tilapia from Thailand, picture courtesy of Tavatchai Chidchomsrichantra

Markets

Tavatchai listed some marketing challenges such as contamination and off-flavour. Buyers usually check for antibiotic residues. Off-flavour is more common in pond reared fish but this can be solved easily by cleaning over 1-2 days with high water exchange. The use of methyltestosterone (MT) for sex reversal is being discouraged in Thailand but regulatory-wise this is still unclear as there are still supplies of all male fingerlings through MT usage.

"The US is the largest market. In 2010, it imported 39,652 tonnes of fish and 153,248 tonnes of fillet. However, we can no longer focus on the US market. The European market has too many conditions which are difficult to comply. The opportunities are in markets in the Middle East and Africa which demands large volumes of small fish of 200-300 g/pc and 300-500 g/pc. Apparently, the Middle East demand is 9,000 tonnes of whole tilapia. But we will be competing against Turkish and Egyptian producers.

"KCF is working with the Department of Fisheries on certification for tilapia producers. This has to be different from that for the marine shrimp which require movement documents for each stage in its production. In the case of the tilapia, it will be difficult to get producers to comply or even register. The local market does not care for GAP (Good Aquaculture Practices). We know that to improve access to markets in the Middle East, we need the halal certification and for the US, the three star BAP."

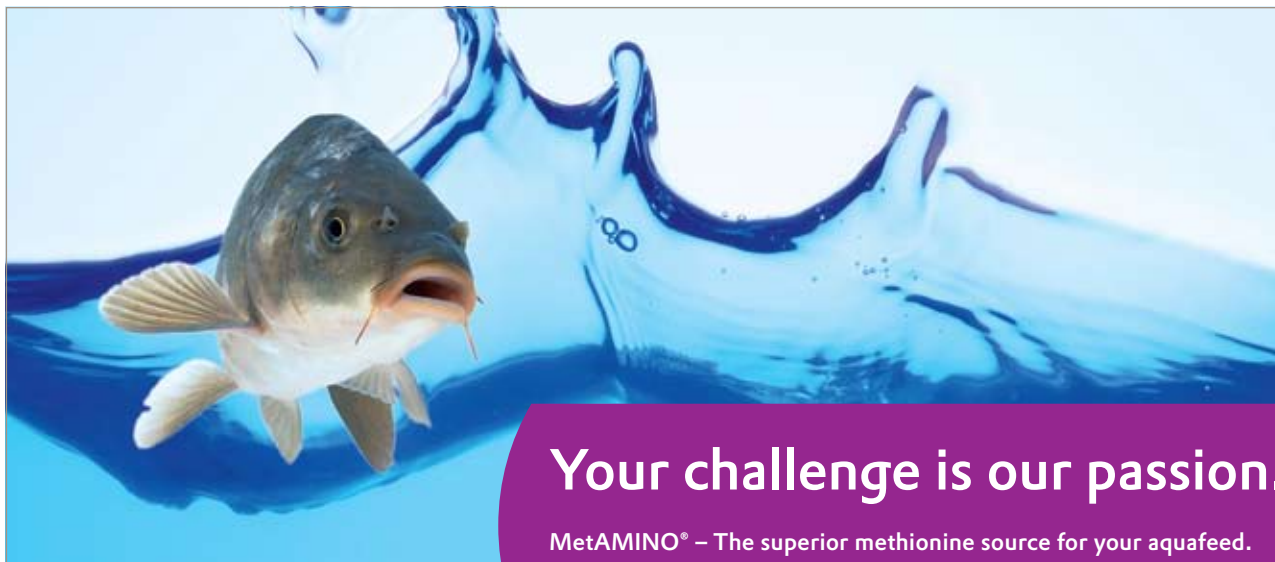
Frozen Tilapia Fillet



Culture management

"With regards to diseases, we also face *Streptococcus* outbreaks and in general there is a need for improved programs such as those based on average daily growth rates with changing temperatures, disease prevention, genetic selections and production of saline tilapia.

"In 2013, there could be some pessimism as a water shortage has been predicted and prices will increase but at the same time, there is a possibility of more bacterial outbreaks when temperatures rise," said Tavatchai.



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Effects of a mycotoxin binder on male red tilapia performance

By Adrien Louyer and Marie Gallissot

The tilapia *Oreochromis niloticus* is a very interesting fish for aquaculture. According to Kevin Fitzsimmons (University of Arizona), tilapia will be the first raised aquaculture specie in a near future, ahead of carp. Its simplicity and robustness appeal to South East Asian fish producers, where tilapia production continues to experience expansion. Indeed, it is easy to raise, is resistant to diseases with a fast growth, and can be easily fed with plant diets (Fitzsimmons, 2012).

There has been considerable effort to optimize production in terms of genetics and nutrition. Improved genetic lines have been selected such as the red tilapia, and various selection programs have been set up worldwide in this regard. On the nutrition side, formulation has improved as well thanks to increased research and knowledge on the subject. However, as all diets are based on plant ingredients, the presence of mycotoxins in the feed is a risk that has to be controlled.

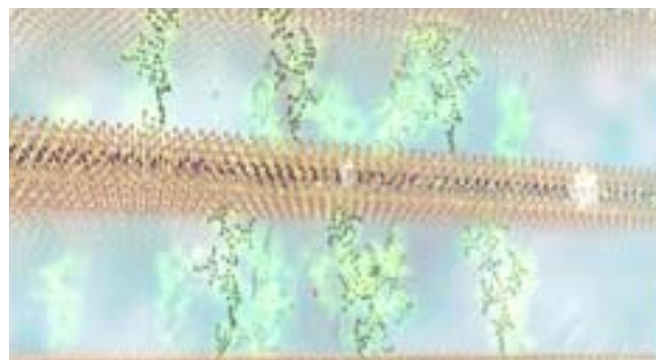
Mycotoxins are secondary metabolites produced by molds in stress conditions. Extensive research shows that tilapia, like other fishes, is sensitive to mycotoxins (Abdelaziz et al, 2010). For instance, it was reported that dietary aflatoxins and fumonisins have deleterious effect on Nile tilapia liver (precancerous lesions, excess lipofuscin levels and irregular hepatocellular nuclei) and impair their growth performance (reduced weight gains and poorer feed efficiency).

Grains and plant ingredients can be contaminated by mycotoxins from the field to the complete feedstuffs. If pellets are stored in dry and cool conditions, there is no further contamination after the extrusion. However, mycotoxins present in the feedstuff prior to the pelleting process extrusion will not be destroyed during this process and will remain in the final feed. Therefore, raw materials have to be managed properly to minimise contaminations and control risk policy should be implemented in the feed plant. Nevertheless, even with the best management practices, it is extremely difficult to achieve a zero contamination. To prevent impaired growth performance or increased sensitivity to diseases, it is advised to use a mycotoxin binder in the feed. Furthermore, the use of a wide spectrum toxin binder is necessary to provide fish a complete protection.



Ulva lactuca seaweed

Olmix has developed a unique material combining specific seaweed extracts and Montmorillonite clay named Amadéite® (see pictures). The adsorption of mycotoxins in this innovative material is a complex mechanism allowing ionic and hydrophobic interactions, thus providing more sites of adsorption for mycotoxins (Havenaar, 2006). MT.X+, the only toxin binder containing Amadéite®, has been widely used in livestock production for nearly 10 years. With an increasing demand from the market, it is now being developed in aquaculture. In order to assess its effectiveness in tilapia, a study was conducted in Vietnam in collaboration with an aquafeed producer located in the Mekong Delta.



Modelling of seaweed extracts interspersing Montmorillonite layers in Amadéite®

Experimental design

Some 2,400 juvenile male red tilapia were allocated in hapas (net pens) during two months. Diets D0 (control) and D1 (test) were randomly allocated to hapas; the trial was done in triplicate. Initial body weight of fish was 5.5 ± 1 g. Fish were fed *ad libitum* three times a day and excess feed was removed 20 minutes post feeding. Water quality was monitored daily to ensure that the tilapias were raised in optimum conditions.

Two diets were formulated, based on the regular feed formulas of the feed mill. Both feed types were extruded as 5 mm floating pellets. The regular diet served as the control (D0) and the treatment diet (D1) is the regular diet supplemented with 0.1% of MT.X+.

Mycotoxin contamination

To assess accurately the mycotoxin risk, it is important to analyse a broad range of mycotoxins. This allows to detect the metabolites of the major mycotoxins, which are sometimes more toxic than the mother molecule. This also allows for a clear view of the degree of polycontamination, which may have more serious consequences on animals health and performance due to existing synergies between several mycotoxins (Oswald, 2011).

Therefore, a sample of the experimental feed was analysed by HPLC MS/MS method in a French independent laboratory, LDA 22. More than 13 different mycotoxins were detected in the feed (Table 1).

Table 1. Mycotoxin concentration of the feed

Mycotoxin	Level (ppm)
Deoxynivalenol (DON)	0.030
Zearalenone (ZON)	0.025
Fumonisin (B1+B2)	0.120 (B1:0.090+ B2:0.03)
Moniliformin	0.150
Tenuazonic acid	0.040
Ergocornin	0.040
Ergocristin	0.115
Ergocryptin	0.075
Ergosin	0.030
Ergotamin	0.070
Aflatoxins	0.005 (AFB1:0.002)
Ochratoxin A	0.005

Table 2. Growth performance of fish fed D0 (control diet) and D1 (MT. X+ diet). Data is means of triplicates.

Parameters	Treatment diets		Variation (%)
	D1	D0	
Survival %	91.8	92.3	-0.5
Final body weight (g/fish)	28.78	27.17	+5.9
Daily weight gain (mg/day)	388	361	+7.5
Feed intake (g/fish)	33.99	34.51	-1.5
Feed conversion ratio	1.46	1.59	-8.2

Discussion

Prior to this experiment, the feedmill estimated that they did not have any mycotoxin contamination in the feed. Meanwhile, the laboratory analysis showed a polycontamination of 13 different mycotoxins. In this context, a negative effect on the immune system with consequences on growth performance was expected.

By adsorbing mycotoxins in the intestine, the binder lowered the absorption of mycotoxins into the body and contributed to preserve intestinal integrity and to avoid immune suppression. As a consequence, growth performance in the treatment group was improved, as shown by the increased daily weight gain and final body weight, and the decreased feed conversion ratio.

The results of this experiment confirm that the increasing use of plant ingredients in fish diets expose them to mycotoxins and affect their production performance, even at low levels of contamination. To counter these effects and optimize the production, the use of this wide range mycotoxin binder is recommended.

References

- Abdelaziz M., et al, 2010. Field study on the mycotoxin binding effect of clay on *Oreochromis niloticus* feeds and their impacts on the performance as well as the health status throughout the culture season". Interdisciplinary Bio Central Vol 2 (6),1-6.
- Fitzsimmons K., 2012. The success story of the tilapia industry; current and future trends of the US seafood market, Nong Lam University Ho Chi Minh, 28 June 2012.
- Havenaar R., et al, 2006. Efficacy of sequestrant/chelator Amadeite, in the binding of mycotoxins during transit through a dynamic gastrointestinal model (TIM) simulating the GI conditions of pigs, The World Mycotoxin Forum- The fourth conference, November 6-8 2006, Cincinnati, Ohio, USA.
- Oswald I., 2011. Mycotoxin co-contamination of food and feed: meta-analysis of publications describing toxicological interactions, World Mycotoxin Journal, Vol 4 (3); 285-313.

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Communication to promote progress

By Tang Xuemin and Xiong Dingle

China's feed and shrimp industry players meet at the 2013 Hinter Symposium Nutrition & Feed Technology of Fish and Shrimp.

In 2012, the shrimp feed industry in China and some Southeast Asian countries faced a crisis with low survival rates, high incidence of disease at the farm level, escalating prices for feed raw materials and increasingly tough market conditions. Coupled with economic uncertainties, many feed companies felt quite helpless and lost as to their next step of action. It was within these conditions that organisers for this year's Hinter Symposium chose the theme 'encouraging communication and promoting progress in the feed industry'. This 2013 Hinter Symposium on Nutrition and Feed Technology of Fish and Shellfish (Shrimp) was held in Zhanjiang, Guangzhou from March 14-16 and attracted more than 350 guests from China as well as from several Southeast Asian countries.

The symposium was organised by Guangzhou Hinter Biotechnology Co., Ltd, Guangdong Haid Animal Husbandry and Fisheries Research Centre. Co-organisers were Zhanjiang Guolian Group, Evonik Degussa (China) and Buhler (China). Guangdong and Zhanjiang Feed Profession Association supported the symposium and secretary-general of Guangdong Feed Profession Association, Cai Yuzhen addressed the meeting. There were eight presentations, which covered the different aspects of shrimp feed and shrimp production including operations, quality control, feed formulation and shrimp culture technology.



Chen Han

In his presentation on 'how to operate an efficient shrimp supply chain, **Chen Han**, president of Zhanjiang Guolian Group analysed the challenges faced. "The shrimp industry encountered large-scale disease outbreaks, shrimp raw materials prices have been skyrocketing from short supply and we have export market malaise and antioxidants residue," said Chen. "As shrimp prices fluctuated frequently, only a few enterprises are able to survive in this environment. With integrated operations from

hatchery, feed, culture to processing, Goulian has the advantage in the international shrimp market."

Zhanjiang Guolian Group exports shrimp to the United States with zero tariffs and is also the first listed shrimp enterprise with industry chains wholly in China. It is usually at the forefront of developments utilising cutting edge technology in its operations. In addition, participants had the chance to visit Zhanjiang Guolian's feed factory, processing factory and shrimp trade market centre. This model of shrimp industry chain, advanced enterprise management and garden-style factory environment impressed participants.

Chuang Jie-Cheng, president of Sheng Long Bio-Tech International Co., Ltd, Vietnam, shared some ideas and trends in the Southeast Asian shrimp industry. "The shrimp industry in Southeast Asian countries is challenged with so many issues: disease outbreaks, high



Chuang Jie Cheng

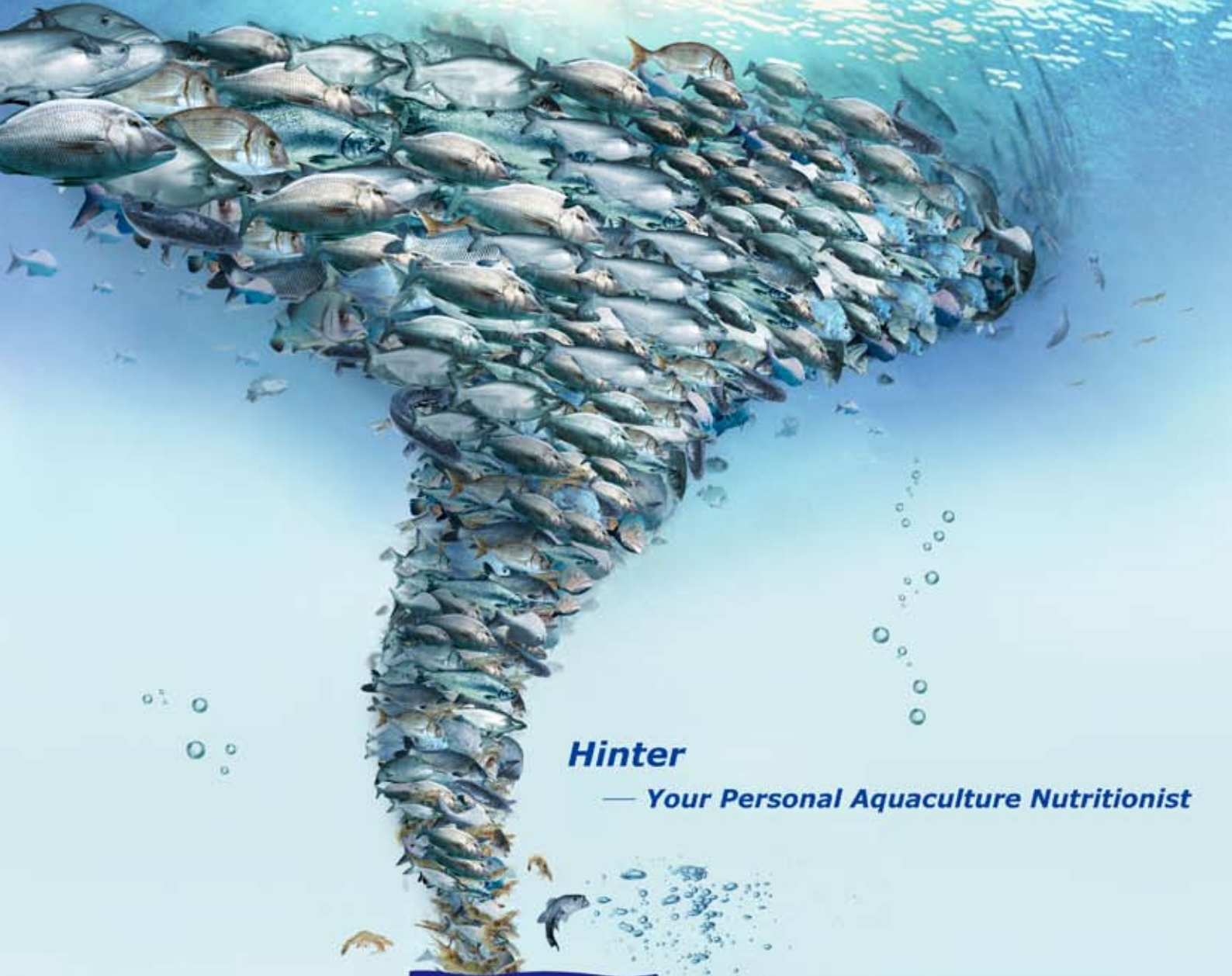
prices of feed materials, a competitive export market, technical barriers such as ethoxyquin residues in exports and lack of capital for operations." Some solutions to overcome these problems were provided. Chuang also shared some trial results in using biofloc technology in shrimp farming in the Ben Tre Province of Vietnam. Although it was a first trial, the research team found that the technology does work. Further research will be

conducted to develop a more suitable biofloc culture method before the Sheng Long technical service team can introduce this technology and help more farmers overcome crop losses.

The presentation by **Dr Liu Donghui**, Guangdong Haid Animal Husbandry and Fisheries Research Centre, covered the developments and counter measures of shrimp feed production in China. He explained that the present problems of the shrimp industry arise from a discord involving the environment, the cultured organisms and pathogens.



Front row, from left, Dr Yang Yong (Hinter), Jie Xiaoli (Advance magazine), Cai Yuzhen (Guangdong Feed Association), Pan Suihua (Haid), Chen Han, Chuang Jie Cheng, Dr Liu Donghui, Huang Zhimin (Guolian), Chen Chenxi (Zhanjiang feed association) and Dr Gao Wen. Back row. From left, Tang Zhigang (Buhler), Han Junwei (second left, Buhler), Peng Shufeng (Guolian), Zheng Zhang (Guolian), Tang Lizhi (Guolian), Dr Zhang Song (Hinter), Dr He Qinghua (Evonik Degussa)



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Speakers from Hinder, from left Wang Rufeng, He Fen and Zhang Song

"For the sake of a rapid economic development and high profit margins, many in the shrimp farming business had caused damage to the environment. However, I am optimistic that as we do more R&D on shrimp seed and feed, shrimp culture will be more environment-friendly. In fact, Guangdong Haid Group has many research programs on shrimp seed, culture technology and shrimp feed and nutrition. It was said that by 2016, the total feed production of Haid Group will reach 10 million tonnes, 50% of which will be aqua feed."

Sharing information

Han Junwei, senior engineer of Buhler (Changzhou) Machinery Co. Ltd, presented the key points of shrimp feed processing. He said, "As shrimp farmers now care more on shrimp appearance, we will require a good production design, better feed formulation, raw material quality control and better machine operations. Many problems often happen during our shrimp feed production and we need our rich experiences to solve them." Han shared some of his experiences with participants.

Wang Rufeng, technical director of Guangdong Haid Group, said that the key point in the shrimp feed industry is how to have

good production planning and the choice of a right culture model. Wang described three great shrimp culture models in China. "Although early mortality syndrome (EMS) has adversely impacted the industry these past years, we have some farmers who have been successful. Some common points for their successes are lower stocking density, larger harvest size, good quality post larvae and good understanding of culture technology. Some farmers do not have enough exposure to technology and experiences and then depend on the feed supplier for technology support."

Amino acids and proteins

In her presentation on the use of synthetic amino acids in aqua feeds, **Dr Gao Wen**, Evonik Degussa (China) Co Ltd presented results from some recent research on amino acid nutrition in shrimp. The trial data were extensive and Gao detailed some methionine requirements in feed for the salmon, tilapia, common carp and vannamei shrimp. "In the case of the shrimp, the requirement of DL methionine is high. When lysine is 2.5% on dry matter basis in feed, the vannamei shrimp of 0.5 g will require 0.9% of methionine as DL methionine," said Gao.

Dr Zhang Song, vice president, Hinder presented results on protein replacement in commercial formulations for *Penaeus vannamei*. He said that with the higher prices of fishmeal and soybean meal, many experiments are carried out every year to find their replacement and several issues such as palatability, amino acid balance, anti-nutritional factors, digestibility and unknown growth factors in the alternative protein sources should be considered. "Our data showed that squid meal can replace 100% of the fishmeal but soybean protein concentrate can only replace 10-50% of the fishmeal, depending on the different protein levels. Rice protein concentrate and poultry flour



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Han Junwei and Gao Wen

concentrate can replace 50% and 80% of fishmeal respectively. Beer yeast can replace 50% of soybean meal for shrimp feeds.”

“When we consider replacement of protein sources, we also need to check on how the new protein source can

affect the feed quality, colour and appearance, as well as its effects on production,” said Zhang.

QC on fish oils

He Fen, technical manager of Hinter presented some of her practical insights on the quality control (QC) of marine fish oils used in shrimp feed. This included how to choose quality control methods for oil. She described methods that can be used to compare fish oil quality from different sources.

According to He, “There are different kinds of animal or plant oils in the market, but only the deep sea fish oil and lecithin have good growth performance capacity. Sampling fish oil from a tank to determine its quality must be carried out properly. More samples from different points of the tank can give a more uniform test results.”

“When we carry out an analysis of physicochemical index of fish oil, many parameters have been mentioned by the feed industry, but only a few parameters (such as acid value (AV) and moisture are actually tested. However, AV alone is insufficient to determine fish oil quality. From the fatty acid composition test result, we

judge the fish oil quality from the EPA+DHA values which are important for shrimp growth. The test of freezing point, electro-conductibility, refractivity, iodine value and saponification value of fish oil can help us to know more about the fish oil quality. On lecithin, we test the insoluble material in acetone and emulsifiability to control lecithin quality.

On oxidative rancidity, He said that liquid oxidation is a very complicated dynamic process. At the beginning of liquid oxidation, AV can be used to judge the fish oil quality, but during the oxidation process, peroxide value (POV), thiobarbituric acid value (TAV), p-Anisidine value (pAV) and Kreis test should be used rather than AV. Another issue is the safety and provenance of the oil.

For all participants, this meeting was more than just a platform to exchange ideas on the future prospects of the shrimp industry. The communication was two ways and Hinter seriously consider the evaluation comments from the participants and will continue to suggest further improvements for us to pursue excellence in our industry.



Tang Xuemin



Xiong Dingle

Tang Xuemin and **Xiong Dingle** are technical director assistants at Guangzhou Hinter Biotechnology Co., Ltd.
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Application of probiotics in shrimp hatcheries improves utilisation of microalgae

Jutta Zwielehner, Gonçalo A. Santos and Pedro Encarnaçao

Freeze-dried algae are alternatives to live feeds and in combination with a multi-strain probiotic improve performance of the post larvae with regards to homogeneity, colour, health and activity.

Feeds probably represent the single largest expense in shrimp larvae production and hence feed management strategies must be fully integrated with health management strategies to optimise production cost. Severe losses in shrimp larviculture are caused by infection with opportunistic pathogenic bacteria, including several members of the *Vibrionaceae* family. Vibriosis usually occurs during the first month of culture and can cause up to 50% mortality.

In this early live stage, the majority of shrimp larvae are reared intensively in the presence of microalgae, which improves feeding, growth and survival of the larvae. These live feed cultures of phytoplankton and zooplankton are grown locally under non-controlled conditions. This is where opportunistic pathogens can proliferate due to the high concentrations of organic matter built up in the culture facilities. Algae, rotifer and *Artemia* cultures can therefore harbour high concentrations of pathogenic bacteria.

Prophylactic treatment of larvae with antibiotics can reduce the pathogen load, but has to be avoided for several reasons; prophylactic antibiotics lead to emergence of antibiotic-resistant pathogens; and impede the establishment of a normal non-pathogenic microbiota.

This scenario has led to an ever-growing interest in the search and development of alternative strategies for disease control, within the frame of good husbandry practices, including adequate hygiene conditions and the use of probiotics, prebiotics and immunostimulants.

Live algae are not easily replaced because they contain nutrients and functional molecules important to shrimp larval nutrition and they possess the right particle size and are palatable to the larvae. Numerous carotenoids, phytosterols and trace elements in algae are necessary for shrimp development. One way to preserve these essential nutrients might potentially be freeze-drying of algae.

Freeze dried algae

A trial was conducted to test the application of freeze-dried algae either alone or together with a multi-strain probiotic for their influence on growth, survival and stress resistance in *Litopenaeus vannamei* post larvae (PL).

Five different treatments were tested, using five replicates per treatment as follows. The probiotics used was AquaStar® Hatchery (Biomim, Austria).

- Live fresh algae (*Chaetoceros*) + commercial diets (Control)
- *Chaetoceros* 2 days + freeze dried algae (FD algae) + commercial diets (T1),
- *Chaetoceros* 2 days + freeze dried algae (FD algae) + commercial diets + 3g/day probiotic/day (T2)
- *Chaetoceros* 2 days + commercial diets + 3g/day probiotic (T3)
- *Chaetoceros* 2 days + commercial diets + 30g/day probiotic (T4).



Vannamei post larvae

L. vannamei nauplii from a reliable hatchery were stocked in 70 L aquarium filled with 50 L salt water at 30 ppt, pH 8.18 and alkalinity 110 mg CaCO₃/L. The approximate temperature was 25.8-28.8°C, stocking density was about 167-201 nauplii/aquarium. The larvae zoea – P2 were fed 7 meals per day and post larvae PL2 – PL15 were fed 6 meals per day (6.00- 24.00). Phytoplankton was fed to shrimp larvae starting in zoea stage and *Artemia* was fed since mysis to PL10.

Commercial powder feed was used until PL15. Water exchange was done on alternate days at the rate of 10%, 20% and 30% for mysis, early PL and PL stages respectively. Water quality was maintained for a proper culture condition.

High concentration of *Chaetoceros* from the commercial laboratory was suspended and sub-cultured for 3 days and filtered through 50µL net before feeding to the larvae. The commercial dry microalgae (GreenStim™ Shrimp Zoea, Mysis and PL, SBAE Industries) and probiotic AquaStar®-Hatchery (Biomim®, Austria) were prepared following the technical protocol developed for the larviculture of *L. vannamei*. Shrimp were tested for ammonia stress tolerance (20 ppm of ammonium chloride solution for 96 h) and *Vibrio* count on TCBS media (no enrichment) after 18h incubation and survival (zoea 3, PL 2 and PL15).

Results from the trial showed that shrimp performance using freeze dried algae (T1) was similar to the control; survival rate was 49.6% (density of 97 PL/L) vs 47.1% (density of 79 PL/L) from the control. Better survival rates were achieved when probiotics were added to the microalgae blend (T2) with 56.1% survival (density of 112 PL/L) or probiotics alone (T3) with 51.0% survival at 103 PL/L density. Lower survival was achieved for T4 where probiotics were applied at 10 times the recommended dosage, with 45.8% survival at 82.6 PL/L.

Although T4 had the lowest survival, the PL size of T4 receiving the multi-strain probiotic at 10 times the recommended dosage was the biggest (Figure 1). They had a very healthy appearance and the highest ammonia stress tolerance at 12h and 24h (Figure 2).

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FD algae

Control shrimp were the least active during the ammonia stress test; they were the most susceptible to ammonia stress and *Vibrio* spp. pathogenic load. At PL 2 and PL15, the *Vibrio* spp. pathogen abundance was significantly lower in T4 than in the control (Figure 3). At PL15 the multi-strain probiotic was able to enhance the beneficial effects of live algae on vibriosis prevention, showing that the multi-strain probiotic was effective in reducing the vibrio load in the water.

Figure 1. Growth and development observations for *L. vannamei* under the four different feeding regimes. Symbols (+, ++, +++) describe qualitative visual observations.

Conclusion for feeding and metamorphosis									
treatment	Metamorphosis performing				Size of PL 15			Characteristics	
	Zoea	Mysis	Post larvae	Health Zoea3	Large	Medium	Small	active	darken
Control	++++	++	+++	++++		++	+++	+++	+
T1	++++	++	++++	++++		++	+++	++++	+++
T2	++++	+++	++++	++++		++++	++	+++++	+++
T3	++++	+++	++++	++++		++	++++	+++	+
T4	++++	+++	++++	+++++	++	+++	+	+++	+

Figure 2. Survival rates (%) of healthy PL15 stressed with 20 ppm ammonium chloride for 96 h.

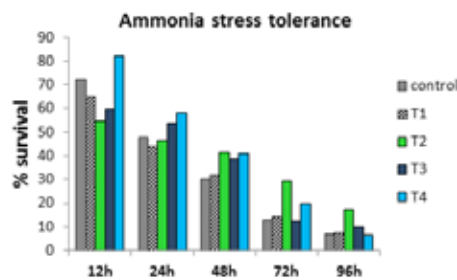
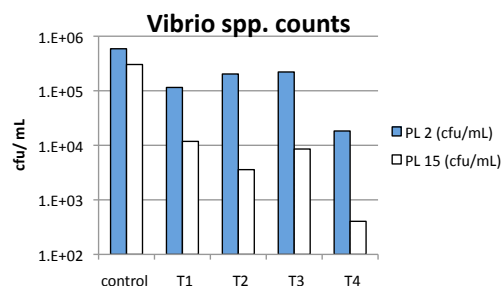


Figure 3. *Vibrio* spp. cell counts (TCBS medium) in post larvae culture water during the *L. vannamei* feeding trial.



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SPF vannamei broodstock for the first time in India

The Rajiv Gandhi Centre for Aquaculture, the R&D arm of the Marine Products Export Development Authority in association with the Oceanic Institute, Hawaii, USA has developed specific pathogen free (SPF) *Litopenaeus vannamei* brood stock in India. These are now ready for supply to hatchery operators at reasonable prices.

The primary objective of this initiative is to produce selectively bred vannamei shrimp brood stock that exhibit good hatchery performance for producing high quality shrimp seed, which should exhibit fast growth and high survival on commercial shrimp farms in India.

During 2011-12, the export earnings for marine products crossed USD3.5 billion. Exports aggregated to 0.86 million tonnes valued at USD 3.5 billion, while seafood exports recorded a growth of 6.02% in quantity, 28.65% in rupee and 22.81% growth in USD earnings. Frozen shrimp is the major export value item accounting for 49.63% of the total US dollar earnings.

One of the major reasons for increased production and higher export turnover was due to the introduction of SPF vannamei shrimp for aquaculture production and the established infrastructure for farming shrimp in India, which can substantially contribute to a higher marine product export from the country. However, a major obstacle for increasing the vannamei shrimp production is the non-availability of quality SPF broodstock in India in required quantities.

Increasing brood stock demand

Currently shrimp hatcheries import vannamei shrimp brood stock from brood stock multiplication centres in USA, Thailand and Singapore. The average cost of brood stock when it reaches the hatchery is estimated at INR5000/pair (USD93/pair) after the additional costs of brood stock transportation and transit loss due to mortality. This ultimately mean higher post larvae to shrimp farmers who purchase seeds at a higher price (INR600 or USD11/1000PL). This prompts some hatcheries to source brood stock from shrimp ponds, resulting in the production of poor quality seeds and subsequent crop loss to farmers. About 80% of shrimp farmers are marginal and small scale farmers with 0.5 to 5ha water area. Success of the crop and sustainability of shrimp farmers largely depends on the quality of seeds as well as reasonable prices.

MPEDA then initiated a collaborative project through RGCA and Oceanic Institute, an affiliate of Hawaii Pacific University, to produce



Fishery scientist and chairman, Scientific Advisory Committee of RGCA, Dr E.G.Silas formally inaugurated the release of SPF vannamei brood stock to Y. Ravi, general secretary, All India Shrimp Hatchery Association and D. Ramaraj of Society of Aquaculture Professionals and an hatchery operator in the presence of Dr B. Meenakumari, deputy director general I, ICAR, and Leena Nair, MPEDA chairman.

selectively bred vannamei shrimp brood stock that exhibit good maturation and hatchery performance.

Though the vannamei shrimp is native to the Pacific coast of central and South America, a major reason for its popularity among shrimp farmers world-wide is the availability of selectively bred fast growing improved quality SPF and specific pathogen resistant (SPR) post larvae. Selectively bred SPF vannamei shrimp is considered more resistant to diseases, has potential to grow under intensive culture conditions, tolerates a wide range of salinities and temperatures, and requires lower protein diet. It can mate and spawn easily under captivity, while utilising the natural productivity of shrimp ponds in intensive culture conditions. Additionally, survival rates during hatchery rearing are generally higher.

SPF post larvae imported from the Nucleus Breeding Centre of Oceanic Institute, shall be grown from post larvae to 40g brood stock in the MPEDA/RGCA facility in Visakhapatnam for six to eight months. The capacity will be 45,000 pieces of brood stock annually. The first batch of around 20,000 high quality SPF vannamei brood stock will be supplied to approved shrimp hatcheries in India at half the price of imported stock.

This project shall help produce 135,000 tonnes of additional shrimp for export worth around INR4,000 million (USD745 million) per annum by utilising about 10,000ha of water area for two crops per annum, to ensure supply of quality seeds required for small and marginal Indian farmers at affordable post larvae prices.



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A renaissance in black tiger shrimp production with SPF post larvae

By Zuridah Merican

A new hatchery in Malaysia brings full circle the passion of its owner and other 'loyal to' black tiger shrimp farmers with supply of SPF post larvae.

Since 2003, as most producers in Malaysia moved wholeheartedly to farming the vannamei shrimp and hatcheries converted to vannamei shrimp post larvae production to meet demand, those remaining with the black tiger (BT) shrimp *Penaeus monodon* faced a shortage of post larvae. Today, there are only 5 major hatcheries producing BT shrimp post larvae supporting an estimated annual production of 8,000 tonnes in 2012. One of them, Manjungjv began operations in April 2012 and produces postlarvae with SPF brood stock from Madagascar. The company is now banking on this supply of postlarvae to bring back BT shrimp farming alongside the vannamei shrimp. The hatchery complements the company's integrated operations in Peninsular Malaysia, comprising 5 farms with 150 ponds in Perak and Selangor and a processing plant in Sri Manjung, Perak.

Yong Kui Thing, managing director, started the Manjung Aquatic group in 1996 to farm BT shrimp and recalled the changing times with the shrimp, "I am really loyal to BT shrimp farming but with the adoption of vannamei shrimp farming by most farmers, it became difficult for me to get good quality BT shrimp post larvae, which we know come from wild broodstock. Around 2005, I had the chance to grow SPF post larvae produced from a selection program using Madagascar-origin founder stock at the Black Tiger Hatchery. Post larvae were expensive at MYR 45/1000PL (USD14.5/1000PL) but I was impressed by their growth performance. More important was that market size shrimp has a standard colouration, unlike those from our local wild broodstock which showed a variation of colours, from blue to brown.

"When this was no longer available with the closure of that hatchery in 2006, I had to follow the rest and farm the vannamei shrimp. I did this for two cycles. Now that Manjungjv has the opportunity to import these African domesticated brood stocks from Madagascar, we have set up this new hatchery. The SPF status of the brood stock is confirmed by the Aquaculture Pathology Laboratory, Arizona University



Manjungjv's team at the hatchery site, from left, Louis Gan, marketing executive, Kristine, Goh Yin Piau and Tan Chun Siong, technical assistant (hatchery).

which has a technical agreement with the brood stock supplier."

Initially, we will use 70% of our target production of 10 million/month to supply our farms and sell the rest in the open market in Malaysia. I would like to say that, all of us who have been loyal black tiger shrimp farmers now have the chance to farm the shrimp without worrying about our next supply of SPF post larvae."

Malaysia's farmed shrimp production, largely of vannamei shrimp has declined by almost 60% to an estimated 60,000 tonnes in 2012 due to crop losses from early mortality syndrome (EMS). Whether EMS affects black tiger shrimp is still subject to debate. Thai shrimp expert, Dr Chalor Limsuwan, Aquaculture Business Centre, Kasetsart University, Thailand, in a recent presentation in Bangkok does not believe that mortality reports in BT shrimp in Malaysia and Vietnam are attributed to the same causative agents as with EMS in the vannamei shrimp. Yong believes that, "With this SPF PL, we may be able to circumvent EMS and we can continue to bring back shrimp production in some farms."

Working to be a top notch hatchery

The first production of SPF post larvae was in June 2012 and since then, the team has been making improvements in particular the water treatment systems. The hatchery, spanning 0.6 ha in Teluk Segari, Perak has separate areas for quarantine, maturation and spawning, hatching and post larvae rearing. The location was chosen because it is an ideal site for drawing good quality water through a sand filter and it is a distance away from shrimp farms.



PL12



Harvest of size 40/kg (24.25g shrimp). Picture by Manjungjv

Goh Yin Piau, group operations manager said, "One of our major deviations from the norm in water treatment, is that, we opted not to use chlorine for water disinfection. Instead we use ozone and a protein skimmer. Water treatment this way is more effective and also safer. In addition, the treated water for the maturation, spawning and larviculture stages are sterilised with UV, and filtered through carbon and cartridge filters. Goh has more than 12 years of experience in the shrimp farming business.

He added that a reason not to use chlorine is also because he has doubts on the purity of chlorine in the market as well as the right dosage of chlorine to use. "We are unique in that we have been experimenting on ways to get the ideal water quality in a safe way. We continuously work on the proper cooling of water which significantly affects the energy efficiency of the ozone generator. We established a hatchery which has a fully controlled environment with bio security features. Our hatchery is accredited with the Malaysia Aquaculture Farm Certificate Scheme and Fish Quality Certificate for Biosecurity Compliance."

Quality

The demand is PL11 which is sold at MYR35/1000PL (USD 11.3/1000PL). Goh said that nauplii and post larvae rearing are only carried at the hatchery to ensure control on quality and nauplii are not sold to the third party hatcheries for on growing. The hatchery will arrange for PCR tests at a private laboratory before sending the post larvae to farmers as this is the requirement by farms certified under the Department of Fisheries' certification program called SPLAM or FQC (Fish Quality Certificate). Tests include white spot syndrome virus (WSSV), infectious hypodermal and hematopoietic necrosis virus (IHHNV), Taura syndrome (TSV), yellow head virus (YHV) and infectious myonecrosis virus (IMNV). Some farmers collect samples to do their own checks at private laboratories.

Farmers have indicated a preference for PL11-12, the stage when post larvae have uniform length. The salinity range for culture is large, from 15 to 25 ppt. The hatchery demands that when farmers order post larvae, they indicate the salinity of culture and the hatchery will start the acclimation process to a specific salinity at PL1. Prior to delivery of post larvae, the hatchery will demand a pond water sample for water quality analysis. The team will monitor the behaviour of post larvae in a water sample.

Goh said, "We usually focus on vibriosis and if we see that the water is infected, we will recommend some probiotics or use of molasses to reduce pH. Some farmers have left the water too long before stocking. Then at the pond site, we usually add post larvae into a tank and observe the activity of the post larvae. We continue stocking only when all is well."

Field performance

The initial batches of post larvae were tested at their own farms in Manjung district. The company advocates a stocking density of 28-30 PL/m². However, Yong thinks that if all is well, there could be a possibility of black tiger shrimp farms returning to higher stocking density prior to the debacle with WSSV in the late 1990s.

However, the harvest results from its farms vary. In a farm in Perak the harvest from 0.4 ha ponds ranged from 3.3 tonnes/pond of shrimp size 33-35/kg (8.25-8.75 tonnes/ha). Stocking density was 110,000 PL/0.4 ha pond (27.5 PL/m²). The feed conversion ratio

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Yong and Kristine. Although only in his late 40s, Yong is already nurturing a second generation for the business.

(FCR) was 1.35 to 1.56 over 100 days. Trials with a second batch of post larvae yielded 6.4 tonnes/pond of 0.8 ha with shrimp size 28/kg after 138 days (8 tonnes/ha). This time, stocking density was 210,000 PL (26 PL/m²).

A renaissance to BT shrimp

“Once more farmers return to farming of BT shrimp, we can look forward to more raw material for the processing plant,” said Yong’s daughter, Kristine who is the company’s project manager. A graduate in marketing, Kristine joined in 2009 and has started the company’s shrimp import and export business. However, she said that there is so


much to learn on shrimp farming in Malaysia and the learning curve is steep. She is also looking at building up the image of Manjung’s BT shrimp with branding.

“Prices of BT shrimp in the local market reached MYR 24/kg (USD8/KG) for size 40/kg in March. This is not much different from that for large size vannamei in our local market but international prices of the BT are higher which makes it profitable to export frozen shrimp. With this shrimp, we hope to improve market demand for BT shrimp which in turn will help us increase production.

“This shrimp has a sweet taste and firm flesh, but this is dependent on the salinity during culture. The best salinity is 25-30 ppt for texture and taste but growth will be slower. What is also unique is that the shrimp grows well at high density.”



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Chinook salmon production in China slows after test marketing

By Bob Tkacz

Chinook salmon from the closed containment system in Benxi, is marketed as a safe seafood for the middle class in China

Years of research focused on elimination of feed, pollution and other problems common to traditional net pen salmon farming led to the start of Chinook salmon *Oncorhynchus tshawytscha* production at AgriMarine's floating tank farm in the Guangmanshan Reservoir outside of Benxi, about 320 km north of Dalian in Liaoning Province. Benxi AgriMarine Industries Inc., and AgriMarine Aquaculture Technologies (Beijing) Co. Ltd., are registered in China as 'wholly foreign owned enterprises' of the Vancouver, British Columbia-based company.

Salmonid production at Benxi began in 2010 with steelhead trout *Oncorhynchus mykiss* to test the technology and because feed was readily available from local manufacturers. Production transitioned from steelhead to Chinook over the past two years.

Benxi's Chinook feed is manufactured in China according to their formula. Chinook eggs are kept in the hatchery for six months before transfer to grow-out tanks where they are expected to reach market size of two kg after 12 months in the Benxi tanks. Harvest of Chinook salmon at the Benxi farm began in September 2012 from Thursdays through Saturdays for overnight transport to Beijing stores.

In the fall of 2012, test-marketing volumes of AgriMarine Chinook were selling out at Ito Yakado and BHG (Beijing Holding Group) supermarkets in Beijing, according to Richard Buchanan, the company founder who retired last year as CEO to a seat on the board of parent company AgriMarine Holdings, Inc. of Canada.

Limited sales of Benxi Chinook continue at selected Ito Yakado stores in Beijing, according to AgriMarine spokeswoman Alexia Helgason. However, market sources said no product could be found in retail Beijing outlets in April this year.

"They did supply some farmed Chinook to the local market, mainly Beijing a while ago. As the size is running small, they are not supplying any of the products at the moment," according to a Shanghai-based seafood marketer.

Closed containment systems

The Benxi farm includes six tanks (24m diameter, 7m deep) that were manufactured in Shenyang from a composite material Buchanan described as the same used to build propellers for wind generators. Onshore construction of the farm's first tanks was replaced by construction in the reservoir after the Chinese divers demonstrated cost-savings.

Tanks are built by connecting 24 wedge-shaped pieces to form a



AgriMarine salmon are harvested with manual labour by drawing nets across a tank. These adjustable rectangles, built into the nets just below surface level, control the size of harvested fish by allowing those smaller than desired to escape.



Juvenile Chinook salmon in a tank in a section of the upgraded hatchery

circular base to which sides are attached. Each tank is moored to a floating dock that provides deck space for machinery, gear and work including manual harvest and bleeding. The entire structure is attached to the shore by a small pier. Tanks are equipped with subsurface video monitoring and electrolysis oxygenation systems, the latter of which is critical. The Benxi farm's onshore facilities include a liquid oxygen supply providing emergency backup.

Buchanan said loss of power to the oxygenation system could result in mortality within hours, depending on the age and density of fish in a tank. Tank systems also include pump systems that circulates water at increasing speed as fish mature, requiring them to swim against a current and improving flesh quality. Excess feed and faeces are drained and piped to shore for use as compost. In 2010 Buchanan estimated the cost of a single complete tank system at USD300,000.

In the original plans, the company projected a ten-tank farm in Benxi, but expansion was stopped at the current six tanks. In 2011 Buchanan said additional tanks would be built as production increased and new investors were found. In 2012 he said the Benxi farm would



Farm under construction in 2011

not be expanded beyond six tanks because of seasonal changes in water conditions. The full reservoir is about 50m deep, but power generation demands lowered it to 30m during the last two summers. Beside the difficulty in dock access from the increasingly steep inclines, the farm was designed to use cold water from reservoir depths to offset warmer surface water during the summer to keep tank temperatures at appropriate levels.

Second farm

AgriMarine had listed a second farm near the city of Siping, Jilin Province, 320km north of Benxi among activities on its web page, but the project has since been removed. There are several reservoirs, some substantially larger than Guangmenshan, in the region and near Jilin City, where carp are farmed. In November, Buchanan said that the Siping farm could be five times as large as Benxi, but not necessarily 30 tanks.

"It's presently licensed by the provincial government and we would buy their existing carp farms and turn them into salmon farms," Plans included construction commencing during the past so that juvenile fish from the AgriMarine hatchery could be put in the water this summer or spring. Buchanan acknowledged that those plans were unconfirmed. Funding was not in place and potential investors were awaiting results of the first Chinook sales closely.

Imported eggs

The Benxi farm is served by its own former trout hatchery, only several kilometers away, that is fed by a drinking water-quality natural spring that was purchased by AgriMarine. In November the hatchery was in the midst of a complete modernisation including replumbing and replacement of concrete raceways with plastic tanks to protect fish from bruising, one of several indicators of AgriMarine's focus on production of a high quality product.

Buchanan also noted that while AgriMarine is becoming nearly self-sufficient in China it would continue to import Chinook and Coho salmon eggs from British Columbia. Chinook farming at Benxi began with two shipments of 500,000 eggs from British Columbian farms. The company's webpage (agrimarine.com) declares that Canadian eggs are 'federally-certified and pathogen-free.'

In a 2010 interview Buchanan said the Benxi farm would eventually reach an annual production of 5,000 tonnes. In November 2012, Buchanan projected annual production from Benxi at 200 to 300 tonnes which he said will depend on grow-out time in tanks. It would take one more season to reach full capacity at Benxi but that all plans are market-dependent.



Benxi salmon at Ito Yokado



Dead or weak Chinook salmon juveniles from the 2011 crop

High end markets

Benxi is selling all Chinook production exclusively to the BHG (Beijing Holding Group) and Japanese owned Ito Yakado retail chains for RMB100 to RMB110 per (USD 16/kg) gutted head-on. About 100 fish per week were delivered to individual stores and are usually sold out by over the weekend, said Buchanan.

However, AgriMarine Chinook could not be found during independent visits to two BHG and one Ito Yakado stores in Beijing on a Saturday last November. Both chains are upscale stores, described by several Chinese and foreign residents as stores where those who can afford the prices go to buy safe food. "They are high-end stores that we are starting with, but average customers," Buchanan said.

According to Buchanan, his intent is to make Chinook and, beginning in 2013 Coho salmon, a seafood staple available to the middle class in convenient forms for modern and traditional Chinese dining convenience. Farmed Atlantic salmon is sold wholesale at 7kg for supermarkets to process to retail portions. Fillets, steaks, loins, heads (with and without meat scraps), scraps and salmon skins, are standard fresh-packaged products in discount hypermarkets, such as the Metro (German) or Carrefour (French) chain, and more upscale supermarkets such as Jusco (Japan), Ito Yakado and BHG.

Much like modern consumers in other countries, the young Chinese do not know how to cook seafood and lack the time and AgriMarine plans to take advantage of that situation.

"Most consumers have not purchased large salmon because they do not know what to do with it. If you give them the right size there are more ways they can cook it at home. We have a lot more variety available to them than Atlantic salmon," Buchanan said, referring to retailers. Without the import duties and transportation costs that burden importers, Buchanan was confident that AgriMarine salmon will be affordable to a broader range of Chinese consumers and well below its international competitors.



Bob Tkacz is based in Alaska and covers the North Pacific salmon industry for more than 20 years. He is a columnist on fish politics for Seattle-based Pacific Fishing magazine and editor and publisher of "Laws for the SEA," an online newsletter covering laws and regulations relating to Alaska's seafood industry. His work has been published by newspapers and magazines throughout the United States. Email: fishlawsbob@gmail.com



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How to optimise colour in farmed fish?

By Alastair Smart



Many consumers and suppliers will often discard tuna, yellowtail, etc and red meat when it has discoloured to an undesirable brown when there is no other significant organoleptic issue, i.e. smell, flavour, and texture. The product may have lost its visual appeal but could still be safely consumed and marinades, cooking, etc could be used to mask the unsightly appearance. Therefore, is it important that we educate suppliers and consumers about basic organoleptic assessment, which involves not only visual appearance, but also the importance of odour?

Tuna

The high value of fresh tuna is largely attributed to the red colour and firm but tender texture of the thin pieces of raw flesh served as sushi or sashimi. A range of factors has been reported to affect the colour and visual appearance of the tuna flesh, along with the rate of colour change, or stability of tuna flesh colour.

What makes tuna look red?

The red colour of tuna flesh is primarily due to the presence of relatively large amounts of myoglobin, an oxygen-binding protein similar to haemoglobin. In the presence of oxygen, the attractive red oxy-myoglobin is dominant, but will degrade during storage to ultimately form brown metmyoglobin. Key management practices in tuna diets, fishing, farm husbandry and processing have the potential to optimise flesh colour and consistency.

Carbon monoxide treatment of tuna

This practice is banned in Canada, Japan, Singapore, and the European Union. It involves exposing tuna meat to carbon monoxide (CO) gas, which binds irreversibly to the haem group producing carboxymyoglobin giving the meat a bright cherry red colour which looks quite different to untreated tuna (this is why CO victims are found bright cherry red too).

The key issue here is that consumers are eating CO, not inhaling CO, and this is quite harmless. CO makes old tuna look visually fresh and brightly coloured. This is the main reason why the countries listed above ban the CO injection (although it is used in Japan, but the product is exported to other countries that allow CO treatment!), not because of the chemical, but because of 'fraud'. The 'fraud' is not about making spoiled food taste edible, you cannot trick your nose or mouth, but it does trick your eyes into thinking you have something freshly caught, therefore there is concerns that consumers may incorrectly consume tuna that has high numbers of pathogenic microbes or histamine (in scombrids) that could cause food poisoning.

Of course we are always trying to extend organoleptic shelf-life through management of temperature, vacuum packaging, modified atmosphere packaging, chlorinated water/ice, etc. Another way of 'brightening' up meat is sodium nitrite, which also improves taste and kills microbes, i.e. bacon, and interestingly some consumers are

attracted to 'organic' bacon which involves getting meat cured with celery juice, which actually has higher levels of nitrite (or nitrate, which turns into nitrite) than inorganic forms. Therefore, this source of organic cured meat actually exposes the consumer to higher levels of nitrite than sodium nitrite cured meats.

Seriola spp. and mahi mahi

CO is also used to brighten the red muscle (often called 'brown meat') line in *Seriola* spp. (yellowtail kingfish, amberjack and kampachi), mahi mahi (*Coryphaena hippurus*), and other species with significant red muscle. In some cases the CO is injected into the veins post-mortem to effect the procedure. Let us not forget that CO is a natural product in wood smoke, which is also utilised to enhance colour and shelf-life in fish and terrestrial meat.

Salmonids

Salmonid colouration is derived from carotenoids, which are present in their diet in the wild and added to their diet in the case of farmed salmon. This is far more stable in providing the characteristic orange colouration than myoglobin but can also be affected by frozen storage and stress at harvest. The key pigments are astaxanthin, adonirubin and canthaxanthin which can be best derived from synthetic sources, or certain bacterial species (i.e. *Paracoccus carotinifaciens*).

Other whitefish species

Studies have demonstrated that whitefish species like seabass and seabream deteriorate in skin colour throughout their post-mortem shelf life. This can be preserved longer by humane harvesting practices such as percussive stunning and electrostunning as well as post-harvest handling practices like temperature control, modified and controlled atmosphere packaging. Typical harvesting practices for seabass and seabream involve simple asphyxiation in an ice slurry and the industry recognises it needs to proactively move towards humane harvest systems in order to improve quality, as well as tap into an increasingly discriminating and educated marketplace that demands humane harvesting practices.

Conclusion

If more countries ban the use of CO then we will have to rely on other management techniques to optimise colour retention as mentioned above. Ultra low temperature (ULT) freezing is already commonly used in the tuna industry, which involves freezing and holding tuna below -60°C. This preserves colour and texture while frozen but is obviously an expensive process. Fresh tuna handled well pre-harvest and post-harvest will retain their colour for 7-10 days but if poorly handled will go brown within 24 hours.

One thing is clear for all species, if harvesting procedures are humane and well managed, stress levels will be lower and shelf life



Alastair Smart is managing director of SmartAqua, a team of aquaculture and seafood business experts with extensive domestic and international experience in a wide number of species (www.smartaqua.com.au). Email: al@smartaqua.com.au

High welfare Scottish farmed salmon - lessons for Asian aquaculture?

As buyers in Europe demand progressively higher fish welfare standards along the production chain, here in Asia, producers may need to look at how welfare can be improved to secure future markets

By David C Little, Douglas Waley, Scott Bremer and Francis J Murray

Everyone seems to have their own idea about sustainability but research carried out by the SEAT¹ project suggests some interesting differences between European and Asian stakeholders. Economic issues ranked high among most Asians- how can any commercial enterprise continue without making money? In contrast environmental and welfare issues were higher up the agenda for many Europeans but the core need to be profitable remained central.

As part of our project activities supporting those involved in the trade of farmed seafood between Asia and Europe, finding ways to 'bridge the gap' between European and Asian understandings of sustainability has been a key focus. The rapid growth in adoption of welfare standards, certified under the Freedom Food label² in the Scottish salmon industry was therefore an intriguing example. Could there be lessons here for other producers supplying the European market? Atlantic salmon farmed in Scotland is a growing industry but as Europe's own self-sufficiency in seafood continues to decline, imports of seafood farmed in Asia, especially shrimp and pangasius also continue to grow. Regulations on animal welfare are being progressively introduced in the EU and securing future markets may require that Asian producers look at how welfare can be improved.

The salmon story

The story of the Scottish Salmon is worth telling because initial scepticism for welfare standards among farmers has given way to enthusiasm as real economic benefits have also materialised. Evidence for this link between improved welfare and profitability had been established by an earlier EU funded research project, Benefish³. Building on this work SEAT produced a short film documenting the perspectives of those involved, including the certifier (Freedom Food) a producer/processor (Marine Harvest), and a major retailer (Sainburys). Translated versions of the film (Mandarin, Vietnamese, Thai and Bengali) are available on line⁴.

Ally Dingwall of Sainburys thinks that the focus on animal welfare has helped connect with consumers. Other certifiers who viewed the film endorsed this sentiment, noting that communication of broader sustainability values can be a significant challenge whilst the concept of welfare is understood by many European consumers more readily. Furthermore, it was accepted that a welfare standard can also achieve many the environmental goals of competing 'sustainability' standards. Other certifiers also acknowledge the importance of stress reduction on post-harvest quality for example by delaying onset of rigor mortis and reducing flesh-gaping in fillets. A key point made in the film is that these standards were voluntary and embraced by the producers themselves without any need for regulation from Government.

Bob Waller of Freedom Food maintains that ensuring high welfare for imported fish during production, transportation and slaughter is every bit important as the welfare of fish farmed in Europe. Professor Jimmy Turnbull of the University of Stirling who has been involved in fish welfare research for several years, commented that any simple direct transfer of welfare friendly practices for salmon to species farmed in Asia was unlikely to be successful. Instead he advocated the need for research specifically targeted on the species produced in the region. Undoubtedly, this would require

investment and take time but the example of Scottish salmon suggests some of the possible benefits.

The film was discussed with Asian stakeholders at the recent European seafood show in Brussels stimulating a wide range of perceptions.



©Freedom Food/Simon Smith Photography

These ranged from interest in the types of measures that could be piloted to improve welfare of Asian species to raised self-awareness that many of the measures taken to enhance productivity of systems were already compatible with improving welfare outcomes.

The SEAT project is interested in your views on farmed seafood welfare and how the industry in countries in Asia could go about improving it. Please visit our website to view the films in your language and then comment on our Facebook page. The most informative and useful posting before June 30 will win a specialist book on fish welfare⁵.

¹ Sustaining Ethical Aquaculture Trade (SEAT, FP7: 222889).

² Freedom Food label; [//www.rspca.org.uk/freedomfood](http://www.rspca.org.uk/freedomfood)

³ Benefish [//www.euraqua-culture.info/index.php?option=com_content&task=view&id=73&Itemid=73](http://www.euraqua-culture.info/index.php?option=com_content&task=view&id=73&Itemid=73)

⁴ <http://seatglobal.eu/2013/04/seat-video-improving-fish-welfare-in-the-scottish-salmon-farming-industry-lessons-for-asian-aquaculture/>

⁵ Branson, E.J. 2008 Fish welfare, Blackwell Publishing



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VIV Asia/Aquatic Asia 2013

The fast moving Asia-Pacific aquaculture business at these trade shows

VIV Asia 2013, the biennial animal feed industry show was held from 13 to 15 March in Bangkok, Thailand. According to organisers, this year, there were 770 exhibitors at VIV Asia and visitors comprised not only key managers representing the growing animal protein industry in South East Asia, but also investors and visitors from India, Pakistan and the Middle East.

The co-located Aquatic Asia 2013 welcomed dedicated aquaculture visitors, making it clear that Asia is the world's market leader in aquaculture. Exhibitors from all over the world, came together to promote their latest aquaculture products. In addition to this, a strong seminar program covered topics from disease prevention, aquaculture equipment to aquaculture standards for shrimp farming. Although the exhibitors in Aquatic Asia number only 17, the range offered at VIV Asia itself comprised 250 suppliers of products for the aquaculture sector. Ruwan Berculo, project manager said, "Our Aquatic Asia exhibition, held concurrently with VIV, has not yet produced the results we intended or expected either. The conference program on fish farming and aquaculture were very well-attended. This aspect forms a firm foundation for future developments. Events that start modestly with a small conference could have the potential to grow into a strong pillar of the VIV-concept. In short, the lines have already been set out for the 2015 edition".

Official review statistics indicated the following for the events: By job function, 21.9% comprised general managers, 14.1%, technical managers, engineers and technicians, 20.2% marketing, sales manager and representatives, 11.6% farm owners and the rest, farmers, researchers, veterinarians and nutritionists etc. Visitor numbers exceeded that in 2011 at 33,229 from 118 countries. Asian visitors were mainly from Thailand at 43%, followed by Vietnam, Indonesia, China and Philippines, India and Malaysia. By sector, visitor interests were in poultry 74.8%, pigs 50.8%, beef 23.2% dairy 25.2% and fish/seafood 25.3%. Visitors rated the exhibition with a score of 8.3, while exhibitors rated VIV Asia 2013 as 8.1.



Visitors to the trade shows welcomed the ease of aquaculture being covered in a small area of the massive VIV Asia. Most appreciated the location, between the VIV hall with products for the animal feed industry and those for feed additives. Aquaculture was well presented with products for culture management, consultancy, farm equipment and autofeeder (Blue Aqua International, Aran Farm International and Charoen Phatara Panich, all from Thailand), sensor based feeding control and sizing systems (AQ1 Systems, Australia), disinfectants and farm hygiene (Axcenvite, France), fish health management (MSD Animal Health, Singapore) and farm certification (GlobalG.A.P, Germany). The range of feed ingredients was from Sonac (animal-based proteins, fats and minerals), Aliphos (inorganic feed phosphates), AL Asia (pellet binder) and Cargill (corn protein concentrate).

During Aquatic Asia, Malaysian AL Asia Chemical marketed its pellet feed binder AQUABOND 910P which it says improves pellet durability with less fines during handling and gives stability of aquatic feeds



At the Wenger booth, Joe Kearns, Wenger, USA with M.V.N Sessa Chary (middle) and P. S Narender, Growel Feeds Private Limited, India.

in water. The product is a co-polymer of biodegradable ingredients in the presence of ammonia. It can be used in either pelleted or extruded feed rations. It functions as a binder for fish and shrimp feeds. AL Asia also markets fish meal with 55%, 60% and 63% crude protein. (www.alasiachemical.com).

Arun International Co Ltd produces several types of equipment for shrimp farming. The hatchery auto feeder can save 80% manpower in feeding activities whilst reducing feed waste by 30% and improving water quality. The controller can handle up to 8 machines. The autofeeder has a solar system that can be used for both shrimp and fish farming (www.aranautofeeder.com).

New groups and aqua conferences

This year, there was a significant presence of groups of aquaculture stakeholders, such as shrimp and fish farmers from the Marine Fisheries Federation of Myanmar which comprises 9 associations; marine shrimp hatchery operators, aquaculture producers from the Philippines, Vietnam, Malaysia, India and an Indonesia group from PT Expravet Nasuba interested in pangasius farming.

To highlight their commitment to share and improve on the aquaculture activities, Bayer Animal Health and its partners conducted four discussion forums on applied technology in Asian aquaculture environment for fish and shrimp aquaculture. Peter Blyth, AQ1 Systems discussed 'how to further optimise feed efficiency?' with their sensor based feeding control technology for aquaculture. Dr Chalor Limsuwan, Kasetsart University, looked at 'how to reduce risks in intensive shrimp farming?' The forum continued into the following day with value generation in the diagnostics of fish disease in Asia by Pete Southgate, Fish Vet group and 'impact of improved stress management in intensive fish farming' by Jason Weeks, Centre for Environment, Fisheries & Aquaculture Science (Cefas, UK).

The Thai Department of Fisheries conducted several panel discussions in the Thai language which covered current issues in

the industry such as trends and the future of the industry as well as how Thai fisheries can benefit in the coming ASEAN Economic Community (AEC) and its implications. The latter was co-presented by a group from the Suratthani Shrimp Club and Thai Frozen Foods Association. Thailand's Aqua Biz Magazine's gathered industry experts to present on several topics such as on the acute hepatopancreatic necrosis syndrome (AHPNS) outbreak, global trends in seafood in 2013,

aquaculture standards in Thailand and other shrimp disease outbreaks in Asia. The presentations sponsored by Blue Aqua International, covered mixotrophic, a new approach for super intensive shrimp culture, benefits of probiotic applications in fish and shrimp aquaculture and application of biofloc technology in shrimp farming.



Dr Jan Koesling (middle) with speakers on day 2 of the Bayer conference, Pete Southgate (left) and Jason Weeks

Applications for fish and water quality

Bayer Animal Health presented its species portfolio of products and services at VIV Asia 2013. Attendees of the trade show were able to discover these products at an informative and interactive booth, while celebrating Bayer's 150th anniversary. For over 90 years, Bayer has been delivering species health solutions to meet the evolving needs by constantly enhancing its products and services for swine, poultry and aquaculture production, as well as through the application of global experience to local concerns.

According to Dr Jan Koesling, Animal Health's regional business development manager, the global pharmaceutical company provides a broad aquaculture portfolio covering the entire production cycle in the main producing countries in Asia Pacific, China and Latin America. Bayer and its licensed partners started over the last decade to offer a growing number of cutting edge technology including water quality

and fish farming. Besides the Bayer brands Hadaclean®A, and Coforta®A the company also offers several products from licensing partners such as PondDtox®PondSafe® from Novozymes Biologicals and Virasure®Aquatic from Fish Vet Group Ltd to complete the range (www.healthcare.bayer.com)

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The team from PT Expravet Nasuba was led by Rachmi Rachman, managing director, (centre, in red). The company has a production of 2,000 tonnes per year of pangasius catfish in Medan, Indonesia. It is affiliated to PT Mabur, a leading animal and fish feed producer.



The group from the Myanmar Fisheries Federation, from left, Win Kyaw, Dr Myint Swe, Hla Khaing, Soe Tint and U Win Kyaing, general secretary.

Certification

Dr Roland Aumüller, head of standards management for livestock and feed reported that the GLOBALG.A.P. team presented the livestock and aquaculture standards at the Aquatic Asia/VIV in Bangkok from. The team conducted two seminars during the show. He conducted the first seminar which was on 'The GlobalGAP Integrated Farm Assurance - A Provision for Best Market Access of Livestock Producers' on March 14. This covered the pillars of food safety, traceability, worker welfare, animal welfare, environmental protection and provided a forum for discussion on the latest developments in the industry. The new GlobalGAP+ Animal Welfare Add-on modules for broilers and finishing pigs, currently under development, were also presented to the public. The first was on responsible use of antibiotics/animal health, and the other on responsible water management.

The second seminar conducted on March 15 was led by Zhou Xing, the China representative of GlobalGAP. It covered 'Aquaculture Certification - One Standard for the Entire Production Chain'. Launched in March 2011, finfish, crustacean or mollusc farming production is able to apply for the GlobalGAP Aquaculture Certification in Version 4. The seminar also introduced localg.a.p., the stepping stone solution towards GlobalGAP certification, which also acts as an important tool for helping producers and retailers gain better access to local and regional markets. Aumüller added that due to several food scandals that have occurred in recent months, the seminars generated enormous interest and numerous discussions on food safety, risk assessment, risk management and quality assurance. (www.globalgap.org)



The GlobalGAP team, from left, Zhou Xin, Flavio Alzueta and Roland Aumüller

Skills development

The new company Progressus recognises that people are the most important resource for agribusiness and offers a unique package to Asian agriculture including education, recruitment and commercial training programs. According to director, Yiannis Chistodoulou, "Progressus provides complete staff development needs for our clients. We know finding the right people is a huge challenge across the Asian region, and we help with that. Most importantly we do not just help find staff but we also help develop existing and new staff through our education and training programs."

Co-director and lead trainer, David Faulkner said "We are a leader in commercial training programs for agribusiness in Asia. Our programs are customised for our clients, highly practical and delivered by trainers that know the industry, they are not off the shelf. We have a simple goal, to help our clients achieve their performance goals."

"We know that companies that engage in training not only improve performance but also retain staff longer because they feel like they are learning and developing. Progressus' programs range from sales, negotiation, key account management as well as more specific skills such as constructing and delivering a presentation, interviewing and so on"

In their education initiative, the company has identified the wide variance in up to date technical and management information that is available across the Asian region. Furthermore, it recognises the need for completely neutral programs, not aligned to any one company or product. The Agrischools cover all species and key management areas such as feed mill management. In-house schools are customised to



Progressus team, Jon Ratcliff (left), Yiannis Christodoulou (middle) and Channarong Preechakul, managing director, TAT Energy and Engineering, Thailand.

client requirements and scheduled Agrischools are held in a central location such as in Bangkok, Thailand where the company is based. In addition, on-line modules for internal training program are currently being developed. All training solutions contain customised commercial training programs, practical innovative methods, and training sessions for agribusinesses designed to enhance skills, provide participants with a set of tools and assist clients to achieve their corporate goals.

Chistodoulou added, "We want to focus on educational and technical programs for aquaculture. These will not be seminars on technical issues but 4-5 days management programs." (www.progressus.asia)

Cloud solution for information interchange in feed industry

Nutrition software supplier Adifo N.V of Begium, has launched a cloud-based collaborative platform as an extension to BESTMIX®, their profit-driven feed formulation and recipe management system. The Formulation gives users online access to a part of BESTMIX® database, and ubiquitous retrieval of minute-precise market data, up-to-date equations and use of the state-of-the-art formulation functionality. They can also record project or customer-specific data such as purchase costs and specifications.

At the VIV press meeting, Hans van der Waal, Market Development manager said, " Adifo has pioneered a new way of working which will dramatically improve the collaborative interaction and information interchange between nutrition experts and all parties involved, including feed advisors, external partners and customers. It also eliminates the need for setting up and maintaining dedicated laptops for account managers or consultants as Adifo backs up data and updates the software continuously, leaving the customer care-free.

"A number of departments have experienced the modification, including account managers and independent consultants, able to simulate adaptations to recipes in meeting specific customer demands and evaluate the cost impact of their adaptations immediately. Additionally, internal departments such as marketing, sales and quality assurance are enabled to produce data and reports without compromising core data. Furthermore, external interested parties may sign knowledge contracts with the nutrition company as well as take advantage of nutritional expertise. Moreover, research centres are able to release their nutritional knowledge to benefit interested parties around the world, while the formulation department can learn about evolving customer preferences by analysing adaptations made by the client."

Adifo's BESTMIX® feed formulation and recipe management system allows nutrition companies to least-cost their products, taking into account all the quality requirements, factory specifications, health and safety requirements, availability of ingredients, purchasing positions and material costs, and environmental and legal aspects of the business.

Fish meal replacements for aqua feed

Netherland based Sonac, a leading manufacturer of animal ingredients, has an active R&D program that constantly adjusts to market needs. It is part of VION Ingredients, one of Europe's largest producers of animal by-products. At Aquatic Asia, Sonac has the haemoglobin powder as an alternative for fish meal. This is a result of the scarceness of fish meal and increasing prices. The use of plant meals is limited because of the unbalanced amino acids profile and lower digestibility. Sonac believes that processed animal proteins are a valuable source of proteins and should be considered as alternatives to fish meal,

in particular for carnivorous fish, larval fish, juveniles and shrimp with more rudimentary digestive systems.

Spray dried hemoglobin powder has a high protein and low phosphorus content and its replacement in the diet of *Litopenaeus vannamei* at up to 6% is a valuable economic option. The company also has hydrolysed mucosa proteins which it says should be considered in shrimp feeds. MucoPro has 71% protein and Gelko, 68% protein. In a trial, Danish fish meal was replaced by either 2% Gelko or MucoPro which showed that the latter can easily replace fishmeal at up to 5% (2% inclusion rate). A recent product for shrimp feeds is Phosterol, a unique protein hydrolysate with a high content of phospholipids, such as phosphatidyl choline, phosphatidyl serine and phosphatidyl inositol. Phosterol is produced from porcine tissue, and after enzymatic hydrolysis, to a heat stable brownish powder. (www.sonac.biz).



From Vietnam, the Viet Uc team led by Steven Luong (second left). The group has hatcheries in several locations from Binh Dinh to Bac Lieu.



Pedro Encarnação, Business Development director - Aquaculture (right) with Herbert Kneissl, Marketing director at the Biomin booth. At VIV, Biomin launched its latest technology in mycotoxin deactivation, FUMzyme®.



Visitors at Aquatic Asia, Bai Hai Wen (left) and Mei Gao Shang, Guangdong Hinter Biotechnology Co Ltd.



Autofeeding technology at the Arun International booth

New strategic developments and aquaculture applications

The Swiss feed additives company Pancosma has a 65-year history in the animal nutrition industry. It now has a €60 million turnover and is active in 54 countries. In Asia, it has a strong presence in Thailand for more than 20 years. The company is now looking at applications in aquaculture for several of its products which are already well recognised for animal nutrition.

During the VIV Asia 2013 press session, Jennifer Maurin, marketing department said that some trials have been conducted on the application of plant extracts in tilapia and on the toxin binder in shrimp feeds. "Pancosma has a new framework in giving sense to our products. We want to better understand our innovations in terms of R&D and marketing. This is called gut effects. We develop strategic partnership with 12 research centres where the R&D strategy is to explore with the centres all sciences related to the gut as immunology, molecular physiology, study microbiota etc. This will help us have a stronger basis to develop new products targeting the gut.

"In our diversification to aquaculture species, we see the potential of two products; Xtract and Black Bio, a toxin binder. The former is a microencapsulated combination of active substances naturally occurring in aromatic plants and spices. In poultry, it stimulates digestive enzyme secretion and improves digestibility. The latter is a thermo structured and non-activated charcoal which has a binding effect with enterotoxins and mycotoxins in the gut." (www.pancosma.com)

Protease usage in aqua feeds

Since 1982, Quebec, Canada based JEFO has been in the animal nutrition market with specialty products such as enzymes, microencapsulated acidifiers, and essential oils. "We started to look at the application of our protease product for fed aquaculture species", said Dr Kabir Chowdhury, product manager-Aquaculture. "This fits well with the requirement in the processing of pelleted and extruded aqua feeds as the enzyme is relatively more heat stable than the common subtilisin-like enzymes. The use of protease in aqua feeds is gaining popularity, not only because of the high cost of fish meal but also because of increasing environment concerns. We have tested its applications in four carp and three salmonid species, a marine species (sea bream), and in the vannamei shrimp. We have shown that fish and shrimp respond well to exogenous protease.

"Research at the Shanghai Fisheries University in 2006 showed a 10% improvement in growth of tilapia fed extruded diets (at 120°C) with protease compare to those fed similar diets without the enzyme. In other species, the work with carps showed higher endogenous enzymatic activity when fish meal in the diet was replaced with soybean meal. In the shrimp, there was a marked improvement in FCR of 2% and 10% in shrimp fed diets with high fish meal and low fish meal, respectively. These findings highlight the efficacy of the protease enzyme to improve the quality of low-digestible protein diets," added Chowdhury.

"Exogenous protease increases feed protein digestibility by hydrolysing the peptide bonds, thus increasing the availability of peptides and amino acids. The increase in villi size and number, hence increase in mucosal surface area, usually results in higher absorption of nutrients. Our research also shows that hydrolysis of proteins in feed ingredients also contributes to the inactivation of some anti-nutrients (e.g., gossypol) in plant meals. This allows feed formulators to use low cost ingredients in the feed formulation." (www.jefo.com)



The Jefo team, Jean Fontaine, president (left) and Kabir Chowdhury, with Herve Lucien-Brun, consultant (middle)

Full circle with blue technology in aquaculture

French feed additive company Olmix which calls itself as 'the algae company' has been involved in the valorisation of algae for the last 15 years. The company has a strong foothold in the natural feed additive business, in particular for animal production with algae and seaweed based products. Since 2011, Olmix has been active in bringing these products developed for animal production to the aquaculture industry. In Asia, the stronger presence began with an Asia Pacific representative office in Ho Chi Minh City, Vietnam. During VIV/Aquatic Asia 2013, Adrien Louyer, Aquaculture technical supervisor, said that there are some products which are showing their merit in the aquafeed and aquaculture industry.

The toxin binder, MT.X+® comprising clay and a patented extract of active ingredients from seaweed binds large molecules with the same efficiency as active carbon without the side effects of it (i.e. sequestering nutrients). The core ingredient is Amadeite®, a Montmorillonite clay interspaced with seaweed extracts (see picture on page 20), providing this innovative material greater toxin binding properties. Louyer said, "Recently, our trials in Vietnam with red tilapia and pangasius showed the efficacy of feed supplemented with 0.1% and 0.15% of MT.X+, respectively. Growth performance increased and daily weight gain was higher. Feed conversion improved by 8.2% in the tilapia and 22% in pangasius. The effects in shrimp feed is being investigated in mid-2013. Thanks to its inclusion in feed, we have seen an improvement of the digestive system as it protects the gut wall and its microvilli. Therefore, fish has better digestion and improved zootechnical performances. We also showed the benefits of the immune system as MT.X+ absorbs endotoxins and helps the fish cope with stressors. Another advantage of the product is its heat stability, allowing the product to be mixed prior the extrusion and to be inside the pellet."

Through an associate company, Amadéite SAS, Olmix Group is also in the nutraceuticals animal health market. This is 'back to basics' Amadéite slogan with algae and seaweed products. The Algo-Bio range has two products with aquaculture applications. Searup "Immune System performance" which comprise algae, marine sulphated polysaccharides, vitamins, amino acids, fatty acids stimulates the immune system and is used together with vaccination management, parasitosis, stress and infectious challenges. The other product is DigestSea which the company says stimulates digestion and protects the kidney and liver. This product comprises water soluble extracts of algae called MSP (marine sulphated polysaccharides), sorbitol, choline, amino acids, vitamins and plant extracts. The dosage will depend on the species. (More information: www.amadeite.com)



At the booth during VIV Asia 2013, from left Matthieu Le Goff, manager Development for Amadéite, Sann Sopheap, Olmix country manager Cambodia, Laos, Myanmar and Bangladesh and Adrien Louyer, Aquaculture technical supervisor

Awarded Asian Personality Award

Erich Erber, chairman of the Executive Board of Erber Group and founder of BIOMIN was awarded the Asian Personality Award at VIV Asia 2013 in recognition of his 30 years of contribution to the field of animal nutrition.

Erich Erber's dedication and foresight has led to numerous innovative and trend-setting solutions for animal production, with a successful business spanning over 100 countries worldwide and more than 1100 employees. This award adds to a series of important events that mark the year 2013 for the company as Biomin celebrates its 30th anniversary and introduces to the market a completely new approach to counteracting fumonisins in animal production.

The Asian Poultry Personality of 2013 Award was handed out during the opening ceremony of VIV Asia 2013 by Nigel Horrox of Positive Action Publications Ltd and Ruwan Berculo of VIV Asia.

"The recipient of this award was told that if you decide to do business in Asia always come again and again to become a friend to your distributors and customers. He did exactly this and moved to live in Malaysia in 1994. He then successfully marketed his company's

products in the region and soon his company's name became synonymous with mycotoxin control. He has always coupled quality service to quality products and now Asia is, primarily through his efforts a key region for his company" said Nigel Horrox.



Erich Erber (second left) with Nigel Horrox (left) and Ruwan Berculo (right)

Investments in algae and nutrigenomics

At their booth, the global animal health and nutrition company, Alltech shared with visitors their latest development in nutritional technology focusing on their 'On Farm Solutions'. It also showcased the company's investments in algae, Nutrigenomics and their renewed focus on crop science. High profile consultants and Alltech personnel participated in the event with interactive displays, technical talks and an Entrepreneurial Dinner focusing on food safety. At Aquatic Asia 2013, Dr. Fuci Guo, South East Asia Aquaculture manager, gave a technical seminar on ways to reduce early mortality in shrimp.

Mathew Smith, director of Asia Pacific spoke of Alltech's direction displayed at VIV, "This year we will be focusing on the idea of Pathway to Profits, exploring solutions that will reduce feed costs while at the same time, increase performance and profitability. We look forward to discussing key issues and solutions with our partners throughout the week."

Alltech also launched Mycosorb A+, the next generation mycotoxin binder which reduces mycotoxin absorption within the animal. The analysis of 2012 harvest showed that 98% of samples tested globally were contaminated and 93% were contaminated with multiple mycotoxins.

A first at VIV Asia was the presence of **Aidan Connolly**, Vice President and author of the annual Global Feed Tonnage survey. Below, he gave some views on the feed survey and Alltech's position in Asia's aquaculture industry.

Why the feed survey

"We know that globally, information is usually collected from third sources by a media organisation. However, we have better resources from our 450 sales staff who visit almost 12,500 feed mills annually. This actually means that we can provide 'first-hand information' which changes each month. Then there is information obtained by FAO which is also far from perfect. Since we have the information, which we originally wanted to keep for company use, we decided, based on the request by FAO, to release this for public policy use."

This worked well for Alltech as the release of the information resulted in 86 media stories within 24 hours.

"So the impact of associating us with the information worked well. We would like to be seen as not only as a supplier of products but also a true partner. In that we can help industry to be more profitable and understand their business better. With the feed survey, we became a 'knowledge leader'."

On the benefit to customers and the company itself, Connolly said, "Our customers may wish to know a volume of shrimp production in another country or the international fishmeal market. This positions us as a leader in the feed industry and in animal production in general but the value of the survey will be more important to our customers."

Outlook on aquaculture

Alltech's aqua business is a relatively small component of the company but it has been growing at the fastest rate. Aquaculture production for fish protein will continue to rise and will be faster than any other industry. However, there are certain challenges, said Connolly. "If we switch to vegetarian feeds following the current trend, we can expect a reduction in DHA fatty acids (docosahexaenoic acid) in flesh of many species of fish and this affects the image of fish as a brain food, source of health and immunity. Aquaculture is safe and healthy but fish does have the image of accumulating heavy metals and toxins in the flesh.

In general, I am optimistic for aquaculture based on our survey but I know that it will also bring new realities in terms of risks management and food safety.

"As we think of moving forward in aquafeed production, we look at the benefits with algae. I believe that we need algae in the fish diets. Three of the top 5 aquafeed producers are working with us on this. They are using algae in a limited way. I would say that we are now at the inflection point and in the near future we can expect a steep uptake of algae. In aqua, we see that we will use crude extracts as a source of protein. There is also the use of algae for its antioxidant and in toxin binding role. The A in Mycosorb A+ means plus algae.

"Aqua has some truly difficult challenges such as in measuring true feed efficiencies and even mortality. I also believe that the complexity comes with the number of species and this makes it difficult for stakeholders to accept information easily. We have products which we have developed for aquaculture such as Aquate for mucus production against sea lice infections. Maybe nutrigenomics can take the information quickly from the zebra fish and apply to salmon. In all, we are still losing too much time with technology transfer."



Aidan Connolly at VIV Asia 2013. Connolly has been with Alltech for the last 22 years. He joined Alltech Ireland, has worked in France, Italy, Brazil, Kentucky and was head of Europe for 7 years. Recently he moved to Washington DC where he has an international role. He is also a Professor of Marketing in the MBA program at the University of Dublin. He now handles global corporate accounts and educational programs

Thai shrimp business in Suratthani

The annual meeting of Thailand's shrimp industry showed the leading position Thailand has in Asia's shrimp farming industry as well as its ability to generate innovative ideas and respond rapidly to challenges.

Thailand has large multinationals in shrimp and seafood processing business such as Charoen Pokphand foods and Thai Union Foods, which contribute to developments in shrimp production and seafood processing, respectively. Participants at the meeting discussed and exchanged ideas aimed at sustaining the industry and heard testimonials from successful farmers at the conference segment of the event held in Suratthani from 23 to 24 February. These demonstrate the strength of the industry among its peers in Asia, particularly with regard to leadership, innovation, and timeliness in responding to and overcoming issues and problems. The organisers, the Thai Shrimp Association and Suratthani Shrimp Farmers Association also lined up some forward looking issues for industry to consider. As the industry passes its 30-year anniversary, it is also nurturing the next generation of industry leaders, now lead by personalities such as Dr Chalor Limsuwan, Dr Puth Songsangjinda, and Dr Surassak Dilokkeart.

The ASEAN Economic Community (AEC), which will start in 2015, envisages an integrated regional economy. The AEC aims to create a single market and production base, a highly competitive economic region, a region with equitable economic development, and a region that is fully integrated into the global economy. In short, the AEC will increase cross-border trade and investment in the shrimp industry, in particular with Malaysia. The presentation from the Thai Frozen Foods Association outlined the steps Thailand's shrimp producers should take to get ready for this, namely for producers to group together and work toward some standards or branding. Through harmonisation of quality, standards and assurances of food safety, producers will be ready to compete in the global market by offering safe, healthy and high quality products.

During the session on sustainability in shrimp farming, Dr Kriengkrai Satapornvanit, SEAT-KU (Sustainable Ethical Aquaculture Trade – Kasetsart University) principal investigator, presented the aims of the project and the activities conducted in Thailand, particularly those relevant to the shrimp industry and Suratthani in particular. The team also presented posters on project activities, and the initial results of the on-going work being done together with the Surat Thani Shrimp Club on the potential of shrimp sludge as a nutrient source for other crops. In his presentation, Dr Robins McIntosh, vice



TRF's team, from left, Surapong Harnkrivilai, Dr Preecha Ekatumasuit and Apiruz Kimawanit

president, Charoen Pokphand Foods (CPF) Thailand looked at the road towards sustainability in the Thai shrimp industry. As the concept of sustainability is consistent yields from crop to crop, he asked whether the Thai shrimp industry has reached a sustainability level as after a long period of growth, it is now being brought down by diseases such as white spot syndrome virus (WSSV), white faeces syndrome (WFS), and most recently, early mortality syndrome (EMS).

The trade show held in conjunction with the annual regional meeting demonstrated the support from industry. Shrimp culture technology in Thailand is constantly evolving with improvements in aeration and feeding technology. Some of these were displayed at the trade show. Top companies such as Marine Leader Co and Cischem Group have developed innovative products and culture technologies through collaboration with industry experts and researchers from renowned universities. CPF Thailand promoted its turbo shrimp post larvae; Gold Coin Thailand unveiled a new generation of post larvae; and Saikaew hatchery's team marketed T-ems (tolerance-early mortality) brood stock and post larvae. Also present was a new feed company Thai Royal feeds Mill (TRF), scheduled to begin production with 500 tonnes of shrimp and 3,000 tonnes of catfish feeds in April 2013.



At the Blue Aqua International booth, from left, Park Yong Duk, CJ Vina Agri, Vietnam, Iwan Sutanto, Shrimp Club Indonesia, Dr Farshad Shishehchian, Blue Aqua International and Assavani West, Malaysia



The SEAT team, from left, Dr Kriengkrai Satapornvanit (middle), Arlene Nietes-Satapornvanit and Dr Francis Murray (right)

Industry first with petfood extrusion validation study

Extru-Tech recently completed an industry-first scientific validation study that used a production-scale extruder to prove extrusion's effectiveness in controlling *Salmonella* in dry pet food.

This maintains its industry leadership role in food and product safety. In effect, Extru-Tech's scientific validation, conducted at the company's Level 2 Bio-Safety Extrusion Lab in Manhattan, Kansas, proved the kill/lethality step of the extrusion system as an effective control against the persistent pathogen.

Since 2010, the Food and Drug Administration has had a zero tolerance policy for *Salmonella*, which is why the pet food industry has experienced a dramatic increase in recalls over the past few years. However, even though every manufacturer strives for products that are 100% pathogen free, applicable and validated scientific studies to support properly designed pet food safety systems have not been possible.

Pet food manufacturers have relied on traditional laboratory studies based on testing equipment ranging from beakers and pressure pots, to table-top model extruders. Moreover, most tests have been completed at very low production rates of 30g to a few kilograms per hour. In contrast, Extru-Tech configured a BSL-2 pilot plant outfitted with an E525 production-scale extrusion system, capable of producing nearly 8,000 pounds of product per hour. The equipment was configured for the production of an industry-generic, low-moisture, dry-expanded pet food. The selected formula was then charged with a three-serotype cocktail of *Salmonella*, an inoculant that represents typical contamination events in the manufacturing process.

As part of the study, Extru-Tech also considered the fact that a dry inoculant introduced into the ingredient stream, better represents how the pathogens are usually present within contaminated raw ingredients. If *Salmonella* is in a liquid, which is often the case in research studies, heat will transfer quickly and kill it quickly. However, this is not a representation of what happens in a pet food plant, and creates a false set of operational parameters that do not control *Salmonella*.

"Extru-tech is using actual equipment that you would find in most pet food plants, in a bio-hazard laboratory or a pilot plant," said Dr Jim Marsden, regents' distinguished professor at Kansas State University. "Raw materials can be inoculated with *Salmonella* or other pathogens and the effect of the extrusion process can be exactly quantified. This process is a breakthrough for the pet food industry."

All three replications of the challenge study resulted in a log reduction of *Salmonella* that exceeded the 5-log reduction requirement of a CCP allocation. Extru-Tech also discovered that many readily available and scientific methods of inoculation rendered a result that was not truly representative of a contamination event, because of the method by which the raw material was inoculated.

"Extru-tech is documenting the parameters that are required to deactivate *Salmonella* in the extrusion process," said Marsden. "There are other production steps that follow where *Salmonella* could re-contaminate the product. Consequently, Extru-tech is looking at those additional steps to identify interventions that could be applied downstream to prevent recontamination."

Extru-Tech, Inc., headquartered in Sabetha, Kansas, currently produces and markets one of the industry's most complete lines of extrusion processing systems, along with a full line of ancillary equipment and customized equipment solutions for specialized processes. Since 1985, it has installed extrusion systems worldwide, designed for the production of human food, pet food, aquatic feed and animal feed products. More information: norms@extru-techinc.com (Norm Schmitt)

First with EFSA opinion for mycotoxin biotransformation

The European Food Safety Authority (EFSA) has adopted a positive scientific opinion on the safety and efficacy of Biomin® BBSH 797.

This makes BIOMIN the first company in the world to receive a positive EFSA opinion on mycotoxin biotransformation. In their scientific opinion, EFSA concluded that Biomin® BBSH 797 (part of the well-established Mycofix® product line) is not only safe for animals, humans and the environment, but also demonstrably efficacious in target species. Following a request from the European Commission, the FEEDAP panel acknowledged the product's efficacy to reduce the epoxide group of trichothecenes to produce less toxic and thus, harmless metabolites. The panel concluded that the evidence presented in *ex vivo* and *in vivo* studies confirms that this efficacy can be realised in animals when the additive is incorporated into trichothecene-contaminated diets.

Trichothecenes comprise the largest group of mycotoxins, the agriculturally most important thereof belonging to type A- (e.g.: T-2 toxin, diacetoxyscirpenol) or type B trichothecenes (e.g.: deoxynivalenol, nivalenol). They are one of the major mycotoxins groups affecting not just Europe but worldwide.

According to the latest Biomin mycotoxin survey report 2012 which analysed 4,023 samples worldwide, DON was found in 64 % of all samples with an average contamination of over 1000 pbb in all tested samples. "In 2010, we were the first feed additive company to submit a dossier for an aflatoxin binder and the first to have a positive opinion by EFSA on the approval of a feed additive with mycotoxin-counteracting properties. The dossier for the trichothecene biotransforming product Biomin® BBSH 797 was submitted only a few months after EFSA officially published their guidance document in 2012," said Dian Schatzmayr, director of Competence Center Mycotoxins within the Biomin Research Center. "The fact that the evaluation process was completed in record time attests once again to the significant level of R&D investment and Biomin's leadership in mycotoxin risk management." added Schatzmayr. More information: www.biomin.net

Less waste and more research are vital to feed the world of tomorrow

Nine billion people are predicted by 2050; two billion more than today and with a growing taste for high protein foods such as fish. How can we feed them sustainably?

By Viggo Halseth

The simple answer is 'by eliminating waste and increasing efficiency'. Doing both at every stage of the aquaculture value chain would make far more efficient use of the raw materials it depends on. The challenge is how to achieve this.

If we are to retain the wild places of the planet; wildernesses, forests, savannahs and oceans, with their uncounted wealth of plant, animal and fish species, radical improvements are essential. We cannot use all the land for food production, therefore we need to increase productivity.

There are clear opportunities in fishing and aquaculture. Through responsible fishing, the oceans of the world can provide a sustainable harvest of wild fish. It is in no one's interest to go beyond that. Equally we should make maximum use of the fish that are caught. The first priority must be food. The second priority is conversion into fishmeal and fish oil; both of great value in aquaculture. I believe all fish caught should be used in one of these ways. It saddens me to see dead fish being discarded when they could be converted to meal and oil. On the positive side, trimmings from fish processing for human consumption increasingly are converted and provide around 25 percent of these marine raw materials. It could be more if all such processing waste were used productively.

Aquaculture is already an excellent converter of raw materials into high quality protein. Fish outperform or match the very best that agriculture animals can achieve. Even so, we can do better. No fish or other animal requires specific raw materials. They need specific macro- and micro-nutrients in the right form and the right balance. If we do not know exactly what those are, we will inevitably waste raw materials as we keep the fish growing and healthy. Progress requires focused research in fish nutrition, by the industry and through government funding.

We have made significant advances in recent years. For example, a more exact understanding of the Atlantic salmon's need for specific amino acids enabled the protein content of feed to be reduced by five percentage points; requiring 12 to 15 % less protein raw materials. More recently Skretting introduced the MicroBalance™ concept, which uses knowledge of micro-nutrient requirements to increase flexibility in raw material choices. In salmonid feeds alone, we reduced fishmeal consumption by over 200,000 tonnes since the concept was introduced in 2010. That is equivalent to 800,000 tonnes of forage fish. MicroBalance is now being applied with more aquaculture species and we are developing it for further species, including shrimp.

Globally, however, a substantial proportion of aquaculture continues to work in a non-scientific manner. That means there is a great potential to further improve efficiency and therefore the sustainability. As Kofi Annan commented at AquaVision 2012, "I do not ask you to change direction, but I ask you to accelerate progress." We must respond positively for aquaculture to fulfil its potential in feeding the future population of the world sustainably.



Viggo Halseth is COO Nutreco Aquaculture & Managing Director Skretting Group

NEXT ISSUE

July/August 2013 issue will feature

• Food Safety & Traceability • Catfish • Marine fish • Feed enzymes

Show distribution: : TARS 2013, August 21-22 Singapore

Deadlines: Technical articles- June 1 2013; Advert bookings – June 7 2013

Contact information: Email: zuridah@aquaaasiapac.com ; enquiries@aquaaasiapac.com

Acquisition in China

The majority share (80%) of Shanghai Shende Machinery Co. Ltd was successfully acquired in February 2013 by the Andritz Group and now part of the Andritz Feed & Biofuel business area.

Shanghai Shende Machinery Co. Ltd was established in 1992 in cooperation with Germany based Munch Group, and has since then developed a good position and excellent reputation in the Chinese marketplace as provider of cost effective feed and biomass technologies and solutions. In recent years, Shende has successfully developed a new technology business within the China and South East Asia bio-fuel sector, where the Shende pelleting technology and plant solutions has proved its performance and reliability.

Shende is today renowned for quality feed processing machines and feed plant solutions, as well as high quality pelletmill dies and other aftermarket products and services to feed plants and biomass pelleting plants. The technologies, project design solutions, customer base and market segments of Shende are considered to be an excellent addition to the current business and growth strategy of Andritz Feed & Biofuel in China as well as other markets outside China.

Shende will be operated from the Shende plant in Songjiang district Shanghai, and will be managed by Ren Shu and the team which during the last 20 years has built up the technology and market position of Shende. Shende product lines, project design and aftermarket offerings will be streamlined and marketed as separate brand relative to Andritz Feed & Biofuel brand product lines and services in the market.

Andritz and its very strong technology position in the global market, will in its ownership of Shende further enhance the development of Shende technologies and services to its customers, and make the investments needed to support further growth of Shende in the China domestic market as well as export business.



Shende's pellet mill

In China, Andritz Feed & Biofuel operates under Andritz China Ltd. with manufacturing plant in Sanshui, Guangdong Province together with project engineering and sales offices located in Liyang City, Jiangsu Province. Andritz is renowned for its extraordinary global growth, organically and by acquisitions and has since the 1990s developed rapidly in China in several business areas.

For year 2012, Andritz has reported global sales of €5177 million, and has around 18,000 competent and motivated employees worldwide, with approximately 1500 people in China, and a further 1400 in other Asian countries.

More information: www.andritz.com, www.shendemach.com

Acquisition of leading aquatic health group

Permira, the European private equity firm announced in March that a company owned by the Permira funds has entered into an agreement to acquire Pharmaq Holding As (PHARMAQ), one of the world's leading aquatic health groups.

The transaction valued at approximately €250 million is expected to complete at the end of May, subject to regulatory approvals and customary closing conditions. Established in 1985 and headquartered in Overhalla, Norway, Pharmaq develops, manufactures and markets vaccines and therapeutic products for farmed fish. It is the market leader in aquatic vaccines, its largest division which accounts for around 70% of sales, with key markets being Norway, Chile and the UK. The company also provides therapeutics and diagnostics services for the fish farming industry. Pharmaq has a strong track record of product innovation, resulting from a firm commitment to a differentiated approach to R&D. This innovation has helped Pharmaq report consistent double-digit growth over the past 3 years. In the year to 2012, sales was around €65 million.

As an industry, aquatic vaccines have grown substantially with the increase in industrialised fish farming, which has led to the need for improved control of infection. Vaccinations are a cost effective,

and safer, approach to treatment and prevention of disease. Farmed fish consumption is expected to double over the next decade, and with the preference towards prevention rather than treatment, Pharmaq is expected to continue its growth trajectory through underlying market development, growth in existing product lines and product innovation.

The Permira funds will back the current management team and will leverage its global network to support the company's international growth and new product development. The investment illustrates Permira's ability to combine its local presence with strong sector expertise, and also draws on Permira's extensive knowledge of the food value chain, following investments in Arysta LifeScience, iglo Group, Netafim, Provimi and Sushiro.

Morten Kr. Nordstad, CEO, said: "We take great pride in supplying the aquaculture industry with the most innovative and effective products to enable them to produce safe and healthy seafood. Permira's significant experience in investing in the food chain and their international reach make them an ideal partner to help us pursue this mission. We are delighted to receive the backing of their funds as we seek to expand our products and market shares in exciting and growing markets."



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Line of aquaculture lighting and monitoring products



BGB Technology has announced the introduction of their line of submersible aquaculture lighting and monitoring products for the global market. These products include their photoperiod manipulation cage lighting systems PISCES 365, 400, and Pisces 1000, which are submersible, pendant, fish cage illuminators using reliable metal halide lamps resembling natural daylight. The lights are encased within corrosion proof housings and available with a variety of cable lengths, with and without connectors. BGB will also offer their TURTLE models

of floating photoperiod lights for use in tanks, ponds and raceways. This is an entirely self-contained floating unit, housing a highly efficient metal halide discharge lamp together with associated control gear. Both products can be used along with the BGB HYDROLUX photometer and feed response camera. A photometer developed specifically for the checking and monitoring of sub-surface light levels within fish cages and tanks.

"We are very excited in our ability to offer the global market these products essential to an aquaculture facility's success and profitability" said Hank Richert, senior manager - Global Business Development. "BGB has had a long history of offering these very successful products within the European aquaculture industry, and with the establishment of our facility in the US. We can now make them available here".

BGB Technology is a global manufacturer of marine, submersible and aquaculture lighting products, with manufacturing facilities located in the US and UK. Its marine products include lighting for yachts, aquatic display lighting, nuclear monitor lighting, feed response cameras, and cage sided control boxes. More information: www.bgbinnovation.com or www.bgbmarine.com Email: sales@bgbtechnology.com

New member to its regional team



With its rapidly increasing growth and presence in this region, BIOMIN Singapore Pte Ltd has announced the appointment of its newest team member. **Amelia Low** has recently been appointed as Regional Marketing Communications Officer. Reporting to Regional Sales and Marketing Director, Dr. Justin Tan, she joins the Sales and Marketing team based in its Asia Pacific regional headquarters in Singapore.

Amelia is responsible for corporate level communications with the global marketing team and will be leading the implementation of Biomin's global branding and marketing programs in the region. She will also support the needs of the various Biomin business units, business partners and customers within the region in order to exceed current market expectations with a particular focus on creating value and increasing awareness and understanding of its products and solutions.

Amelia graduated from the University of London, London School of Economics and Political Science with a Bachelor of Science in Business degree. Prior to joining Biomin, Amelia held a regional marketing role in an international organisation. Her experience and knowledge in various aspects of marketing will bring value to the team and help meet an ever-increasing demand for high quality products and services, which will further contribute to the existing success of Biomin in the Asia Pacific region.

20th Annual Practical Short Course on Aquaculture Feed Extrusion, Nutrition and Feed Management

**September 22 - 27, 2013,
Texas A&M University, USA**

A one-week Practical Short Course on Aquaculture Feed Extrusion, Nutrition and Feed Management will be presented from September 22 to 27, 2013 at Texas A&M University by staff, industry representative and consultants. This program will cover information on designing new feed mills and selecting conveying, drying, grinding, conditioning and feed mixing equipment. Current practices for preparing full-fat soy meal processing; recycling fisheries by-products, raw animal

products, and secondary resources; raw material, extrusion of floating, sinking, and high fat feeds; spraying and coating fats, digests and preservatives; use of encapsulated ingredients and preparation of premixes, nutritional requirements of warm water fish and shrimp, feed managements and least cost formulation are reviewed.

Practical demonstration of sinking, floating, and high fat aquafeed, are demonstrated on four major types of extruders (dry, interrupted flights, single and twin screw), using various shaping dies. Other demonstrations will include: vacuum coating and lab analysis of the raw material for extrusion. Reservations are accepted on a first-come basis.

More information, program details and application forms; Email: mnriaz@tamu.edu (Dr Mian N. Riaz, 2476 TAMU, Food Protein R&D Center); Web: www.tamu.edu/extrusion



Exhibition & Conferences for feed ingredients, additives and formulation



Exhibition & Conferences for feed processing technology

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Aquafeed Horizons Asia 2014

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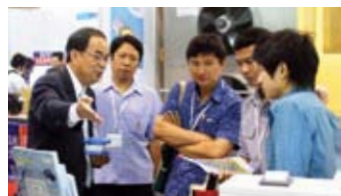


Contact details

For visitor, exhibition stand space and conference information please visit:

www.fiaap.com or

www.victam.com



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Launch of FIAAP / Victam / GRAPAS Asia 2014

New in 2014 is the ASEAN feed and rice symposium, the ASEAN Feed Summit and the ASEAN Rice Summit

At the press conference, held on 14 March 2013, Henk van de Brunt, general manager, Victam International announced the activities at FIAAP / VICTAM / GRAPAS Asia 2014 scheduled for 8-10 April 2014 in Bangkok, Thailand. The exhibition will be held at the Bangkok International Trade and Exhibition Centre (BITEC).

There will be FIAAP Asia 2014 which will be the conference for the ingredients, additives and formulation of feed for animals, aquafeed and dry petfood for the expanding Asia Pacific markets. VICTAM is Asia's largest event profiling suppliers of technology and equipment for the production of animal feeds. International companies will be showing the very latest technology available to the industry; these include Amandus Kahl, Andritz, Buhler, Extru-Tech, Muyang, Ottevanger, Wenger, ZCME, etc. Many of these well-known companies also manufacture specialist pellet mills and systems for the production of biomass pellets, which are increasingly being used as a source of green alternative energy, as they can be used domestically, industrially and by small power plants.

GRAPAS is also consolidating its reputation in the region. The show profiles rice milling and packaging, flour milling, grain processing, transportation, storage, preservation, etc. The production of breakfast cereals, extruded snacks and noodles is also included within the exhibition. Once again well-known and respected international suppliers to these important industries will be represented: Agromatic, Altuntas, Buhler, GSI, SCE, Stolz, Wenger and more.

New for 2014 are the ASEAN feed and rice symposium, the ASEAN Feed Summit and the ASEAN Rice Summit. They will be attended by presidents, secretary generals and senior members of the ASEAN feed and rice associations.

Van de Brunt added that the event in 2012 attracted over 6,000 industry executives throughout Asia from 37 countries. "It was a truly international and successful event.



At the launch, Henk van de Brunt (right) with Pornsil Patcharintanukul, President of the Thai Feed Mill Association and a member of the Board of Charoen Pokphand Group of Thailand (middle) and Phusit Sasitaranondha, managing director, Expolink Global Network Ltd.

"Many of you may not know that the Victam International is a subsidiary of the Victam Foundation, a Dutch charitable foundation. I am pleased to announce that the foundation will sponsor and support the summits. The aim of the summits will be to bring together an international forum of feed and rice associations and other related associations in the Asean region in order to discuss and determine the future policies for these important industries. With the creation of the ASEAN economic bloc in 2015, it is essential that feed millers and processors and their relevant associations should have a greater dialogue.

The summit will be hosted by the Thai Feed Mill Association, Thai Rice Associations with the support of the ministry of Agriculture and the Thai Chamber of Commerce. More information: victam.com

What can you expect from AQUA Culture Asia Pacific in 2013

Volume 9 2013			
Number	4 – July/August	5 – September/October	6 – November/December
Issue focus <i>Recent developments and challenges for the next step</i>	Food Safety & Traceability	Sustainable & Responsible Aquaculture	Culture Technology
Industry Review <i>Trends and outlook, demand & supply</i>	Catfish	Marine Fish	Freshwater Fish/Prawn
Feeds & Processing Technology <i>Technical contributions influencing the final value of aqua feeds</i>	Feed Enzymes Product Quality	Feed Probiotics Good Manufacturing Practices	Nutrition & Formulation
Production Technology <i>Technical information and ideas</i>	Hatchery Technology	Certification and Regulations	Hygiene & Food Safety
Aqua business <i>Feature articles</i>	Experiences from industry, including role models, benchmarking and opinion articles in shrimp/fish culture		
Markets	Market trends, product development and promotions at local and regional trade shows		
Show Issue <i>Distribution at these events as well as local and regional meetings</i>	The Aquaculture RoundTable Series (TARS 2013) -Finfish Aquaculture August 21-22, Singapore	18th China Seafood & Fisheries Exposition 2013 November 5-7, China	Asian Pacific Aquaculture 2013 December 10-13 Ho Chi Minh City, Vietnam*
<i>*Show preview</i>			
Deadlines Articles	June 1	August 1	October 1
Deadlines Advert bookings	June 7	August 7	October 8



THE AQUACULTURE ROUNDTABLESERIES® 2013

A shared vision for aquaculture in Asia



FINFISH AQUACULTURE: INDUSTRIALISATION AND SUSTAINABILITY

21-22 August 2013, Holiday Inn Atrium, Singapore

Asian finfish producers have a large role to supply the future global demand for farmed food fish of 79 million tonnes by 2021 (OECD-FAO Agricultural Outlook 2011–2020), which is 33% higher than the production in 2009–2011. Compared to finfish production in Europe and the Americas, which is well structured and industrialised, in Asia, we see different production styles for the major commodity species such as the tilapia, pangasius catfish, barramundi and for the niche market species such as groupers, snappers, pompano and yellowtail that vary geographically and species-wise. The challenge for Asian producers is to move from small family to sustainable industrial, integrated and monoculture operations.

This third Aquaculture Roundtable Series (TARS 2013) will focus on how to bring forward Asia's Finfish Aquaculture through **Industrialisation and Sustainability**. TARS 2013 will look at challenges along the supply chain and progress in controlled production methodologies and science for the industry to expand; genetics, intensification and controlled hatchery operations; production concepts; threats from diseases, rising production costs from feeds to labour inputs; economies of scale and year round production for major species. Changing conditions in the white fish markets for tilapia, barramundi and pangasius catfish from Asia require that we address issues such as food safety, quality standards, impact on the environment, poor marketing and the negative image of Asian finfish.

As one of the industry's foremost opinion-leading events, TARS 2013 will take a holistic approach to tackle these challenges. This conference is a follow-up to the successful second meeting in The

Aquaculture Round table Series (TARS®) that focused on the shrimp aquaculture value chain in 2012 in Phuket, Thailand. TARS 2013 is organised by Aqua Culture Asia Pacific Magazine and Corporate Media Services, and is supported by the Agri-Food & Veterinary Authority of Singapore.

Opportunity for multi-stakeholders

As we tackle issues across the finfish supply chain, TARS 2013 brings together key stakeholders from farm and hatchery managers, integrators, technical staff, nutritionists, breeding and culture technologists, feed, ingredient and equipment suppliers and specialists to academia, policymakers, NGOs, marketers and investors. The event is unique and provides a neutral platform for all participants to share an open dialogue on current and emerging challenges, share the latest scientific, technological and market developments, and collectively put forth a roadmap to ensure the sustainable farming and profitability of finfish aquaculture in Asia in the coming years.

Industry experts

The plenary session will be facilitated by international experts from Asia and Europe. Three farm managers will present their experiences while industry experts will cover developments in their specific areas of expertise. The breakout session provides all participants with the opportunity for real time discussions and deliberations on how to take the finfish industry forward.

Registration

The number of participants will be limited to 200. Pre-registration is required. Walk-ins are not encouraged. Register online or complete the registration form to reserve space. You will be asked to specify your preferred area of interest for the breakout session.

For more information on registration, program and presentation update, visit www.tarsaquaculture.com Email: conference@tarsaquaculture.com

Program Highlights

Domestication and selective breeding in Asia: the tilapia model and implications for the marine fish



Morten Rye

"Well-designed breeding programs have increased the animals' biological efficiency and resulted in dramatic reductions in production costs and increased profitability. Most productions are still utilising wild germplasm or stocks recruited from narrow genetic bases and in initial stages of domestication. Here, I will focus on the importance of adequate domestication strategies..."

Industrial finfish hatchery in Asia: towards quality barramundi fry production



Frank Tan



Tan Kay Heok

"We will describe our journey in transforming this business to a viable large-scale barramundi hatchery and farm supplying vaccinated barramundi fry and fingerlings to farms in the region. MLA is setting a standard for the consistent supply of quality fry..."

Industrialisation and sustainability in tilapia production - from small business to market leader: an industry perspective



Freek Huskens

"PT Aquafarm Nusantara, Indonesia (PTAN) is part of Regal Springs Group an integrated aquaculture operation producing traceable tilapia from hatchery to the distribution and branding of fillets. I will describe our production model of land-based hatcheries and grow-out in floating cages in lakes and strong sense of social and environmental responsibility since its beginnings in 1988..."

Intensive hatchery management: monoculture production and learning from experiences in the Mediterranean



Alessandro Moretti

"Hatchery production is supporting the growth of fish farming in the Mediterranean, providing fry in large numbers and with enhanced quality. I will discuss intensive production methods and data on overall quality and deformities. State-of-the-art will be thus analysed in order to understand new opportunities and the strategies for the future..."

Production systems: business models, efficiencies and investor outlook



Bjørn Myrseth

"I will begin with the very successful business model used on the Faroese islands for production of Atlantic salmon. I will then look at successes and failures in Norway and move on to discuss why integration and consolidation take place and compare this with the chicken industry. Finally, I will explain what investors are looking at when they consider the finfish aquaculture business..."

Program (as at press time)

Day 1 Wednesday, 21 August 2013 (program starts at 7.30am with registration)

Session 1: Breeding and Hatchery Management

- **Domestication and selective breeding in Asia: the tilapia model and implications for the marine fish** – *Morten Rye, Akvaforsk Genetics Center, Norway*
- **Industrial finfish hatchery in Asia: towards quality barramundi fry production** – *Frank Tan, and Tan Kay Heok, Marine Life Aquaculture, Singapore*
- **Intensive hatchery management: monoculture production and learning from experiences in the Mediterranean** – *Alessandro Moretti, INVE Aquaculture, Belgium*

Session 2: Production, Health and Environment

Part 1: Industry Reviews

- **Production systems: business models, efficiencies and investor outlook** – *Bjørn Myrseth, Vitamar AS, Norway*
- **Industrialisation and sustainability in tilapia production - from small business to market leader: an industry perspective** – *Freerk Huskens, PT Aquafarm Nusantara, Indonesia*
- **Industrialisation and sustainability in marine fish production in Asia** – *Misai Tsai, PT Lucky Samudra Pratama, Indonesia*

Part 2: Fish Health

- **Managing fish health in tropical 'open-water' systems - the way forward** – *Neil Wendover and Norman Lim, Merck Animal Health, Singapore*
- **Overcoming bacterial virulence using quorum sensing - hitting below the MIC belt** – *Tim Goossens, Nutriad International NV, Belgium*

Session 3: Feeds and Feeding

- **Beyond a vision of 2020: the future of the ideal aquaculture feeds in Asia** – *Brett D. Glencross, Aquaculture Feed Technologies Research, CSIRO, Australia*
- **Evolution of performance feeds - from the marine fish to the tilapia** – *Michel Autin, BioMar West Med.*
- **Functional nutrition to sustain high feed and fish performances** – *Vincent Fournier, SPF-Diana, Aquativ, France*

Day 2 - Thursday, 22 August 2013

Session 4: Marketing & Sustainability

- **Asian finfish aquaculture: building a positive image** – *Anton Rizki, Kiroyan Partners, Indonesia*
- **The white fish in the major markets (TBA)**
- **The sustainability challenges of fish meal and fish oil crisis in the finfish aquaculture** – *Ioannis Nengas, Alltech Europe*
- **Mitigating environmental risks: lesson learnt and zonal management for sustainability** – *Han Han, China Program, Sustainable Fisheries Partnership Foundation (SFPF)*

Breakout sessions

Moving industry forward! The participants will form break-out groups to identify key challenges, priority areas for improvement and recommend strategies to take the industry forward. Led by a facilitator, there will be multiple groups brainstorming on the suggested areas below, namely:

- Breeding and Hatchery Management
- Production, Health and Environment
- Feeds and Feeding
- Marketing & Sustainability

Review session

An interactive session where group leaders from each breakout group summarise key discussion points on challenges, identification of focus for improvement and recommend ways to move industry forward. Common factors will be identified and presented in a report accessible to all participants.

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Beyond a vision of 2020: the future of the ideal aquaculture feeds in Asia



Brett D. Glencross

"The technology underpinning the development of modern aquaculture feeds has reached a stage where it is now possible to estimate the ideal feed specifications for any species and any stage of its grow-out production. To further improve performance efficiency these specifications will need to be continually refined for each species, production..."

Functional nutrition to sustain high feed and fish performances



Vincent Fournier

"Improving feed functionalities with the dietary inclusion of selected raw materials, ingredients or additives is becoming more and more usual and considered as really efficient to prevent nutritional disorders and enhance fish resistance to biotic and abiotic factors, contributing to better farm productivity..."

Overcoming bacterial virulence using quorum sensing - hitting below the MIC belt



Tim Goossens

"Quorum sensing (QS) inhibition as an alternative strategy to reduce the impact of bacterial diseases in aquaculture. QS is a form of bacterial communication that allows bacteria to coordinate biochemical responses often associated with virulent bacterial signalling..."

Asian finfish aquaculture: building a positive image



Anton Rizki

"Reputation is an intangible asset and a badly damaged reputation will harm businesses. By using case studies such as that of the Vietnamese pangasius catfish industry, a number of common social and environmental issues that may affect reputation will be discussed. We will see how CSR principles and the stakeholder management mindset can be applied for setting the groundwork prior to improving image..."

The sustainability challenges of fish meal and fish oil crisis in the finfish aquaculture



Ioannis Nengas

"I will discuss some advances which are mainly related to sustainability in European aquaculture. This will include Marine Harvest in Norway and in the Mediterranean and how they handle diseases with parasites which sometimes is devastating for other producers. Feed sustainability is important for industry worldwide and I will discuss algae as new, 'green' ingredient of aquaculture and also our research alliance project with Nofima, Norway which is to find new solutions for sustainable feeds in the future..."

Mitigating environmental risks: zonal management for sustainability



Han Han

"The Chinese tilapia industry, has suffered from disease in the past five years. Along with a comprehensive study combining both biochemical analysis of farm's internal and external aquatic environment and a socio-economic research on the supply-chain dynamics, a zonal management approach that facilitates co-operation and communications among stakeholders has been explored in Hainan Island, China. Importance of cultural and institutional factors in zonal management for aquaculture in developing countries will be discussed..."

Aquaculture Technology Innovation Forum- FITA 2013

June 11-13, 2013
Lombok, Indonesia

This forum on innovations in aquaculture technology (FITA) is an annual event organised by the Centre for Aquaculture Research and Development of the Ministry of Fisheries and Marine Affairs Indonesia in cooperation with other departments, Universitas Mataram, Shrimp Club Indonesia (SCI) and Indonesian Feed Mills Association (GPMT). This is in line with the government's strategy to speed up the industrialisation of aquaculture through R&D support. FITA is a gathering of all industry to facilitate the sharing of the latest innovations and information emanating from research undertaken by various research institutes and centres in the country and exchange of ideas between industry and researchers.

This year's theme is 'Aquaculture Innovation for the Blue Economy'. It will be held at Hotel Lombok Raya, Lombok Island from 11-13 June 2013. Although most of the contributed presentations will be in the Indonesian language, the keynote speaker session will be in English. The aim of this session is to disseminate information from other

countries in the areas of nutrition, disease, genetics, and aquaculture technology and product development. Other activities will be a poster session and trade show organised by the SCI.

As at press time, the organisers have announced the following keynote speakers;

- Dr Farshad Shishenchian, Blue Aqua International on the global aquaculture outlook
- Mahar Sembiring, CP Prima Group, Indonesia on the development of domestic markets for aquaculture products
- Dr Timothy Flegel, Centex Shrimp Thailand on the EMS in Thailand
- Dr Orapint Jintasathaporn, Faculty of Fisheries, Kasetsart University, Thailand on management of water quality.

More information: Web: rca-prpb.com

Email: publikasi.pb4@gmail.com (Suprapti)

Details on the events below are available online at <http://www.aquaasiapac.com/news.php>
To have your event included in this section, email details to zuridah@aquaasiapac.com

May 30-31

4th Aquatech Aquaculture Expo and Convention Philippines 2013

Tagaytay City, Philippines
Email: mgv.equipinc@yahoo.com
(Mary Ann Venturina)

May 30-June 2

Aquarama 2013

Singapore
Web: www.aquarama.com.sg
Email: Aquarama_2013@online.ubmasia.com.sg

June 3-14

Shrimp Pathology Short Course-Disease Diagnosis and Control in Marine Shrimp Culture
University of Arizona - Tucson Arizona, USA
Web: <http://microvet.arizona.edu/research/aquapath/index.htm>
Email: ritar@email.arizona.edu

June 25-27

Vietfish 2013

Ho Chi Minh City, Vietnam
Email: info@vietfish.com.vn
Web: www.vietfish.com.vn

August 9-12

Aquaculture Europe 2013

Trondheim, Norway
Web: www.easonline.org

August 21-22

The Aquaculture Roundtable Series (TARs 2013) –Finfish Aquaculture

Singapore
Web: www.tarsaquaculture.com
Email: conference@tarsaquaculture.com

September 2-5

Larvi 2013 - 6th Fish & Shellfish Larviculture Symposium

Email: larvi@UGent.be
Web: www.aquaculture.ugent.be/larvi/index.htm

September 4-6

Genomics in Aquaculture Symposium (GIA 2013)

Bodø, Norway
Web: www.gia2013.org
Email: secretariat@gia2013.org

October 7-10

GOAL 2013

Paris, France
Email: homeoffice@gaalliance.org
Web: www.gaalliance.org/GOAL2013/index.php

October 6-10

10th International Symposium on Tilapia in Aquaculture (ISTA10)

Jerusalem, Israel
Web: www.ista10.com
Email: kevfitz@ag.arizona.edu/vlaqua@volcani.agri.gov.il

October 10-12

Shanghai International Fisheries & Seafood Expo (SIFSE)

Email: Shelly.zhou@gehuaexpo.com
Web: www.sifse.com/en
Email: squarama_2013@online.ubmasia.com.sg

November 5-7

China Fisheries and Seafood Expo 2013

Dalian, China
Web: seafoodchina@seafare.com
Email: jennie8888@seafare.com (Jennie Fu)

November 7-9

Expo Pesca & AcuíPeru

Lima, Peru
Web: www.thaiscorp.com
Email: thais@amauta.rcp.net.pe

December 10-13

Asian Pacific Aquaculture 2013

Ho Chi Minh City, Vietnam
Web: www.was.org
Email: worldaqua@aol.com

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We probably wrote about \$5 million worth of business at the show and we would expect that to convert, on an annual basis, to around \$10 to \$12 million.

Eric Barratt
Sanford Fisheries Ltd.

November 5-7, 2013

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