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AQUA CULTURE
Asia Pacific

Controlling IMNV in Vannamei Shrimp in Indonesia

New Benchmark for Postlarvae in Vietnam

Amino Acids in Aquafeeds

RSA in Asian Shrimp

Challenges to Finfish Aquaculture in Asia

MICA (P) 008/10/2013 PPS1699/08/2013(022974)

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OUR MISSION

- 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.

From the editor

Changing our mind-sets to work together

The third of the Aquaculture Roundtable Series recently concluded in Singapore. This year's focus was on Finfish Aquaculture – Industrialisation and Sustainability. Following its signature *modus operandi*, the two-day meeting presented a neutral forum for industry stakeholders from the Asia Pacific region to come together to dialogue and deliberate on issues concerning the sector and put forth strategies to ensure the profitability and sustainability of finfish aquaculture in the long run. A summary report on TARS 2013 is included in this issue and will also be featured in the coming issues of AAP. However, I wanted to share some take-away messages that came out of the meeting.

The most striking point is that the Asian finfish industry is a multi-species one and no single species has the economies of scale. One could argue exceptions such as the pangasius but this will be addressed later. There is a lot to learn from elsewhere especially how the cost of production for salmon has gone down and how it is sold everywhere. The salmon industry is a single species model while the Mediterranean industry with European seabass and bream is a duo species model. The economies of scale allows for sufficient thresholds to spur support industries such as seed and genetics, feed and processing. Salmon has benefited from generic marketing but not the seabass and seabream.

All agriculture industries are highly dependent on genetic selection for better yield and aquaculture is no different. The salmon is close to its 10 generation today in terms of genetic selection and its growth has doubled while the feed conversion ratio (FCR) is close to one. While it has taken more than two decades to reach this level, we were told that with the majority of the leading Asian finfish species, this time can be reduced by half to reach the same level such as has been shown with the tilapia. Dr Morten Rye said it only took 5 years. The major feed suppliers in EU are volume producers allowing them to fine tune nutrition to deliver minimum feed cost per kg of fillet yield as opposed to FCR. These large feed suppliers have now come to Asia bringing with them the same expertise to improve on nutrition for some Asian species.

Here is Asia, feedmillers produce freshwater fish and marine fish feed but they are not species-specific and often there is no differentiation between nutrition for the different ages of the species. The only difference is the size of the pellet to match the size of the fish. In marine fish, there is little or no differentiation between Asian seabass and grouper diets while higher protein diets are fed to fingerlings. The pangasius industry is a majority fillet product for export but yet the industry only measures FCR.

The Asian fish market relies heavily on live and fresh chilled markets and hence is limited due to logistical challenges. This small market is very price elastic and any increase in supply will bring down prices. The shrimp industry has become a global commodity because it can be processed, frozen and stored for long periods, resulting in an international market with lower volatility of prices. Here, credit has to be given to the Vietnamese pangasius exporters who have built an international commodity in a period of less than 10 years with the country's processing capability and generic marketing efforts. The Asian fish industry must expand its product range from fresh chilled to frozen fillets.

How do we achieve economies of scale? One way is vertical integration which is driven by keeping the "value added" within the same company. The advantage is that the company acts like an accordion – when one sector is compressed, another expands and there is an overall net benefit along the value chain. Traceability is the driving factor and markets prefer integrated operations. Another way is through horizontal alliances where all farms act as a group and amass sufficient power to negotiate with buyers. The idea of fish producers competing against each other is a myth. In the stomach of the consumer, the competitor to fish is chicken, beef and pork and not another species of fish. Working together is key. There needs to be a change in mindset for this development phase.

Zuridah Merican

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CVD on shrimp imports to US

Zero duties for Indonesia and Thailand and marginal change of duty to 54.5% for Malaysia

On August 19, the US Department of Commerce (DOC) released its final ruling on the countervailing duties (CVD) on shrimp imports from seven countries: China, India, Thailand, Malaysia, Vietnam, Indonesia and Ecuador. In December 2012, the Coalition of Gulf Shrimp Industries (COGSI) initiated a petition that the seven countries were subsidising their shrimp industries and the increase in subsidised imports is hurting the US shrimp industry. The coalition represents shrimp processors from Mississippi, Texas, Florida, Alabama and Louisiana, which make up 94% of domestic shrimp production.

Malaysia was imposed the highest level of duties at 54.5% for others, lower than the earlier ruling of 62.74%. The mandatory respondent in this investigation, Kian Huat Aquaculture received duty of 54.5%. DOC calculated a countervailing duty (CVD) rate for the voluntary respondent, Asia Aquaculture, Star Feedmills, and Charoen Pokphand Foods (Malaysia), (collectively, the Asia Aquaculture Companies) at a lower 10.5% in comparison to an earlier 10.8%.

Syed Omar Syed Jaafar, president of the Malaysia Shrimp Industry Association said the local shrimp industry stands to lose over USD155mil in revenue per annum should the CVD be finalised. Malaysia does not have antidumping duties on its shrimp exports to the US and in 2011 was the smallest exporter at 27,618 tonnes. Local output was 65,000 tonnes in 2011. Local consumption ranged from 36,000 to 45,000 tonnes/year. In the Star, he added not only did the DOC believe that Malaysian shrimp producers were heavily subsidised but that some producers were involved in the trans-shipment of shrimp from a country subjected to US antidumping duties. There are some 23 shrimp-producing companies in the country. However, another hurdle for the local shrimp industry is the European Union's (EU) GSP preferential tariff of about 4% enjoyed by Malaysian shrimp producers exporting to the EU. This will expire in January 2014.

At the other end are zero duties for Indonesia and Thailand. On their website, lawyers for the Indonesian Government and the two mandatory respondents PT Central Pertiwi Bahari and PT First Marine Seafoods, said that they have successfully demonstrated that the 22 subsidy programs alleged by COGSI were unsubstantiated, resulting in final *de minimis* CVD margins that were even lower than the preliminary margins announced. The two respondents received subsidy rates of only 0.23% and 0.27%, respectively. The final negative determination applies to the country as a whole.

With rising prices, producers of black tiger shrimp in Bangladesh expect to gain market share in the US market. Picture courtesy of S. M. Nazmul Alam

In the preliminary determination, duties for the two respondents from Thailand, Marine Gold Products and Thai Union Frozen Products Public Co was set at 1.75% and 2.09%, respectively. This was reduced to 1.52% and 1.41%, respectively. These rates are *de minimis*, resulting in a final negative determination that applies to the other producers/exporters. On the contrary, Ecuador which earlier received a *de minimis* rate for other producers/exporters now has 11.68% and 13.51% for Promarisco and 10.13% for Sociedad Nacional de Galapagos.

The rate for all other producers/exporters in Vietnam was reduced marginally to 4.52% whereas the rate for mandatory respondent, Minh Qui Seafoods rose to 7.88% but declined for Nha Trang Seaproduct, 1.15%. Vietnam Association of Seafood Exporters and Producers (VASEP) has protested and said that the imposition of the DOC's CVD is 'unfair' on Vietnam shrimp exporters and producers, who comply with a market mechanism and have never received any government's subsidy or any other kinds of subsidies for its shrimp sector. It added that the decision also means that the US has levied twice on the same products, the anti-dumping duty and the CVD, thereby directly affecting the lives of 600,000 locals working in the Vietnam shrimp industry." VASEP also hopes that in the next stage, the US International Trade Commission (ITC) will review and make a fair final ruling.

China's leading exporter of frozen warm-water shrimp Zhanjiang Guolian Aquatic Products saw its preliminary rate rise to 18.16% from 5.76% and the rate for all other producers and exporters also rose. In the China Daily, the company said that will continue to fight against this increased rate and the chairman has been leading the company's on-going fight against the US duties. It added that this is the first time the US has set punitive duties on Chinese agricultural exports.

Duties for Indian companies, Devi Fisheries Limited and Devi Seafoods are 10.54% and 11.14% which are marginal changes. The duty for all other declined to 10.84%. According to industry in India, exporters are not much perturbed as the demand from the US is on the upswing and the dollar continues to appreciate against the rupee. In the Business Line, K.G. Lawrence, vice-president of Seafood Exporters Association of India (SEAI), pointed out that together with the anti-dumping duty 3.66%, the total import duty of Indian shrimps in the US would be roughly 10%.

According to US DOC, the US imported more than 984 million pounds (447,272 tonnes) of shrimp valued at USD4.3 billion in 2011. Overall, shrimp consumption in the U.S. is increasing and Gulf Coast processors are working to stay competitive in a growing market. ITC will make the final determination final injury determinations on September 19, 2013.

EMS/AHPND and Inbreeding

Geneticist Dr Roger Doyle gives a different point of view and looks at this as an inbreeding problem

Since 2009, EMS or early mortality syndrome affecting both P*enaeus vannamei* and *P. monodon* during the first 30 days of culture have devastated industry in China, Vietnam, Malaysia and more recently in 2012, Thailand. It has been confirmed in Mexico in August 2013. The Thai Frozen Food Association expects a production of only 270,000 tonnes compared to 485,000 tonnes in 2012 (Bangkok Post). In issue July/August, Aqua Culture Asia Pacific magazine reported that Dr Donald Lightner from the Aquaculture Pathology Laboratory at the University of Arizona, USA has identified the pathogen has as a unique strain of a relatively common bacterium, *Vibrio parahaemolyticus*.

In Thailand, on May 31, Dr. Roger Doyle, CEO of Genetic Computation, Ltd., and a retired professor of biology from Canada's Dalhousie University, gave a 36-minute, thought provoking lecture "Artisanal tropical aquaculture in a genetic plunge towards extinction", a timely reflection on the role between inbreeding and disease, to the Network of Aquaculture Centre in Asia Pacific (NACA) Secretariat and Department of Fisheries, Thailand (DOF). Doyle also served as coordinator of the Aquaculture Genetics Network in Asia under IDRC. Doyle was presented with an award by NACA and the DOF Thailand in recognition of "his significant contributions to the science of aquaculture genetics and related human resource development in the Asia-Pacific region."

Below are some points from his lecture. A video podcast of the presentation is available for download / online viewing at the NACA website, http://www.enaca.org/modules/news/article.php?tag_id=7

"I am going to look at this crisis from the point of view of a geneticist and evolutionary biologist. So far most of those who have been trying to solve this problem have been microbiologists. I am going to present a different point of view on this disease and look at it as an inbreeding problem," said Dolye.

"Shrimp breeders have brood stock that they have collected at great expense with full diversity, high quality and biodiversity. They take great pride in maintaining its genetic quality by keeping inbreeding at a low level while selecting for rapid growth and high survival. They are quite good at what they do.

"Normally, a very small fraction of the breeder's gene line gets sent to hatcheries. Breeders sell their very best families, the families that genetic analysis predicts will be the most productive in hatcheries and on farms. Usually, it is just the offspring from a couple of families. All the male parents are brothers and all the female parents are sisters. There are several reasons for doing this. One reason is to make sure that the post larvae (PLs) have absolutely zero inbreeding. Usually they are hybrids of two families that are as distantly related as possible. Another reason is to make sure that the PLs are as uniform as possible. The third reason is to protect their investment. If farmers grow the animals to maturity and then breed them, the offspring from the second generation will be inbred and not perform well.

Here in Thailand, as many as 60% of the farmers are purchasing PLs that were produced from farm grown, second-generation brood stock. These are from copy hatcheries. In fact, the copying goes on and on through several generations, and the offspring get weaker and weaker and more susceptible to disease with each new generation. Now with the deteriorating effect is causing diseases and is the effect of higher hierarchy of copying, added Doyle.

A farm with fully lined ponds operating in the central region of Vietnam. Lowering stocking density have helped some farms to overcome EMS.

"I have some information from a shrimp breeder in Mexico, Farallon Aquaculture that supports this hypothesis. Farallon select and produces good quality PLs that are widely copied and reproduced by farms and hatcheries. In 2012, the government of Mexico surveyed farms that used farm-grown brood stock and brood stock that came directly from the shrimp breeder."

He presented a chart which showed how much better the yield is with the PLs that came directly from the breeder (the non-inbreed stock), compared to PLs that represent the copied stock. The survey was done in the state of Sinaloa on the northwest coast of Mexico, where there is big white spot syndrome problem. He commented that in his experience, the general belief in aquaculture that with selection for faster growth, there is trade off with disease resistance, is not true.

What inbreeding does is increase seasonal susceptibility to environmental stress. As there is little information in shrimp on inbreeding, Doyle referred to work on effects of seasons on both inbred and outbred fruit flies. When the weather changed to for the worst, inbred animal suffered. There was no effect on the outbred animals. When the weather was better, the inbred animals still suffered.

"The point about inbreeding is that copying hatcheries can do well for several years. Farmers buy because it is cheaper and there is no advantage to buy from breeders. Inbreeding is not bad, but what does matter is that inbreeding reduces the threshold."

Referring to work at Oceanic Institute, Doyle said that shrimp showed a severe effect of inbreeding. Why this happens is because shrimp has high fecundity similar to oysters which also demonstrate similar effect of inbreeding. He also discussed the monoculture effect as the one genotype increases the risks of epidemics. He suggested that geneticists, epidemiologists and ecologists should come together to look at the problem. They need to see where the genetic diversity is so low that the threat of diseases is so high.

Acknowledgement:
The bulk of this report is presented courtesy of Bob Rosenberry, Shrimp News. http://www.shrimpnews.com/FreeReportsFolder/NewsReportsFolderCanadaRogerDoyleInbreedingEMS.html

News in Brief

Record highs in shrimp prices

US shrimp prices are at an all-time high at USD 6.10/lb (Urner Barry Shrimp Index). This was attributed to low supply as early mortality syndrome or EMS affects production of top producers. Thailand will likely only produce 270,000 tonnes in 2013 in comparison to 485,000 tonnes in 2012, according to the Bangkok Post. It usually exports 80% of production. Ex-farm prices rose to THB 217/kg or USD 6.74/kg in early September for size 70/kg. Local prices are also at an all-time high in Malaysia at MYR 21.5/kg or USD6.42/kg for the same size. This surge in price in the US market is pushing up prices in Indonesia where EMS has not been reported. In Antara News, chairman of the eastern Indonesia Shrimp Club Indonesia, Hasanuddin Atjo said that ex-farm prices for the black tiger and vannamei shrimp in East Java rose to IDR 75,000/kg or USD 6.61/kg. "These prices are almost twice of those in 2012," said Atjo. "In India, prices have increased recently by 60% to INR 470/kg (USD 7.3/kg)," said a processor in Andhra Pradesh.

Frozen tilapia prices near 5-year highs

As China's tilapia production is lower this year, low supply and rising demand have raised prices (seafood.vasep.com). In August, Urner Barry's closing average prices for frozen tilapia was USD 2.35/lb or USD 5.17/kg (for 3-5 oz fillets) or about 24% higher than last year's September 2012 prices (for 7-9 oz fillets) which was USD 1.83/lb. According to one major importer, in 2012, China's production woes were a result of massive buying when US importers took advantage of a glut of cheap tilapia in summer that drove US imports up 65% compared with 2011. This jump on summer orders saw replacement costs or the import value/lb plummet from USD 1.94/lb or USD 4.26 in May 2012 to USD 1.75/lb or USD 3.85/kg in October 2013. As a result of lower prices, farmers had a slow start in 2013. Farmers also face higher costs of feed. Importers said these increased costs have pushed Chinese tilapia farmers out of business, unable to produce under tight margins.

Better days for BT in Bangladesh

As the US is the second largest importer of their shrimp, producers in Bangladesh expect better prices and larger export volumes as major competitors have countervailing duties. In the Daily Star, Md Amin Ullah, president of Bangladesh Frozen Food Exporters Association (BFFEA) said, "Even if we raise our prices by 5-10%, we will still enjoy a competitive advantage as our prices will remain below what our competitors will have to offer after the duty imposition." In early August, black tiger shrimp prices rose to USD 13.6/kg for size 16-20/kg. Exporters now charge USD 7.50/lb or USD 16.5/kg in the US market. Amin expects that the price might increase to USD 8/lb. Shrimp exports rose by 33.9% to USD 56.55 million in July compared to July 2012, according to data from the Export Promotion Bureau. Around 35% and 45% of the shrimp exports go to US and EU markets, respectively. BFFEA also wants to increase production in the 275,000 ha of farming area and utilise idle lands. It also said that farmers will switch from traditional methods producing 250 to 300 kg/ha to semi-intensive cultivation which can produce 800 kg to 1 tonne/ha.

New fish feedmill in Ghana

This is a USD 5 million fish feed mill with an installed capacity of 24,000 tonnes per year (tpy) of aquafeed at Prampram Ghana, reported the Daily Graphic. The Israeli mill, Raanan Fish Feed West Africa, is the first in West Africa to produce floating extruded fish feed for tilapia and catfish. Currently it produces between 1,000 and 1,400 tonnes of feed/month for both the local and export markets. The feed mill sources 70% of its raw materials locally. The company has also set up an aquaculture training centre outside Kumasi, to train small farmers. It has also established a research centre for students at the university in Kumasi to undertake scientific studies in aquaculture. Ghana's fish feed demand is 460,000 tpy and with this new feed mill, capacity will increase to 420,000 tpy. Fish consumption is high at 25 kg per capita.

Shrimp in a crimp

Rabobank has released a report on the turning point for the global shrimp industry. It said that EMS is responsible for the largest ever supply contraction and record shrimp prices. Smaller shrimp producing regions can step up production and capture the market share. There is hope the disease will be under control soon and the industry will emerge more consolidated with multinational producers leading the next growth wave.

"After a decade of explosive growth, the global farmed shrimp industry has reached a turning point. The EMS outbreak in China, Vietnam and Thailand has created double-digit yearly contraction in shrimp supply, leading to prices hitting record levels. However, regions unaffected by the disease are emerging to fill the supply void and are benefiting from this high price situation. Producers in Ecuador, Indonesia, India, Bangladesh and Myanmar are rapidly expanding production," said Rabobank analyst Gorjan Nikolik.

However, the current shrimp supply deficit could reverse in 2014. Due to a rapidly increasing understanding of the EMS pathogen, it is likely that a solution for the disease will be found in short to medium term. A return of Thailand to the top of the shrimp exporters' table combined with production expansion by the second-tier regions enjoying the current high prices, will create a sudden supply curve shift and a period of low prices. For Asian exporters, a long term strategy to mitigate against volatile price swings is to export processed shrimp products that are less commoditised. However, a lack of knowledge of local markets and links with local retailers and buyers has proven to be key entry barriers for Asian suppliers to EU and US markets. Therefore Rabobank believes there will be an increase of intercontinental mergers and acquisitions to create integrated producers

Public comment for Seriola and Cobia standard

The second draft version of the global Seriola and Cobia Aquaculture standards is now available for public comment. The draft standards are the product of a World Wildlife Fund (WWF)-coordinated roundtable that includes producers, conservationists, scientists, and other leaders from across the supply chain. This second and final public comment period concludes October 15, 2013. The Seriola and Cobia Aquaculture Dialogue Steering Committee will use feedback from both public comment periods, along with input collected from an upcoming public dialogue meeting in Japan, to ensure that the final standards have taken into consideration the views of all stakeholders. A copy of the revised Seriola and Cobia standards is available at http://www.worldwildlife.org/SeriolaCobiastandards.

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Prevention and control of IMNV in vannamei shrimp in Indonesia

By Poh Yong Thong

In the absence of therapeutics against this disease, prevention through basic good aquaculture practices and biosecurity is key to overcoming crop losses.

Ecological disturbances particularly global warming events which cause surface water temperature to rise coupled with the increase in farming intensity spurred by economic gains have enabled conditions which favour the onset of bacterial and new viral shrimp diseases. Walker et al. (2009) believed that infectious myonecrosis virus (IMNV), like white spot syndrome virus (WSSV) and Taura syndrome virus (TSV), emerged through cross species transmission. The increase in trading activities due to globalisation has resulted in the trans boundary movement of alien species, which sometimes inadvertently are contaminated at source.

Indonesia is one of two countries officially recorded to be infected by IMNV, locally called 'myo'. The first report of the disease was from northeast Brazil in September 2002. In Indonesia, it was first reported in May 2006 in Situbondo in East Java (Senapin, 2007). It then spread rapidly. By April 2007, it reached northeast Sumatra, and by the third quarter of 2009, arrived in ponds in West Kalimantan and Sulawesi.

Dead shrimp affected by IMNV in different stages of severity from right to left

Senapin (2007) speculated that the Indonesian IMNV originated from contaminated brood stocks imported from Brazil. This was based on the observation that 99.6% of the local IMNV nucleic acid sequence was similar to that of the Brazilian IMNV recorded in the GenBank.

IMNV viral particles were said to be viable for a long time, with claim of over 60 days (unconfirmed sources) compared to 3 days for WSSV particles. The genetic material is an RNA which makes it much more labile with faster mutation as compared to WSSV whose genetic material is a DNA. It can occur during cold or hot season, unlike WSSV and TSV which are more virulent only below 26ºC but are rarely found at temperatures above 30°C.

Damage to crops

In most cases IMNV affects shrimp at 40 or more days of culture (> DOC40). Infected shrimp show symptoms of lethargy, loss of balance, swimming near the surface, reduced feeding and development of whitish necrotic striated muscles that soon become reddish, similar to cooked shrimp, followed by elevated shrimp mortality.

The onset of the disease is related to stress factors ranging from changes in temperature and salinity, to rough handling such as during partial harvest or sampling by cast net. Prolonged high temperature above 32°C normally resulted in *Penaeus vannamei* feeding excessively. Thereafter, due to elevated ammonia concentrations in the culture system, shrimp experience increased stress leading to increased mortality. The shrimp may still be feeding well just before the onset of stress and some moribund shrimp are found to have a full gut. Unlike WSSV, mortality is gradual which gives farmers a false sense of calm leading to complacency. Detection of IMNV has been possible since 2004, with the nested PCR method (IQ2000) developed by GeneReach Biotechnology Corp, Taiwan.

Economic loss

In IMNV affected ponds, unlike in WSSV infected ponds, shrimp die slowly. As a result, survival rate is lower and feed conversion ratio (FCR) rises, elevating production costs. In a study reported by members of the FKPA team (Forum Komunikasi Praktisi Aquacultur or the Aquaculture

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Early stage of IMNV manifestation with whitish necrotic striated muscle at the distal segment (top photo) (source: Dr Donald Lightner, University of Arizona, USA)

Practitioner Communication Forum) in Lampung in 2011, the average survival rate dropped from 82% in 2007 to 55% in 2010. In severe cases, survival can be below 25%! Elevated FCR and reduced survival will result in tremendous economic loss for the farmers.

Prevention measures

As there are no therapeutics yet, industry has to depend on prevention through basic good aquaculture practices and biosecurity, which are discussed below:

Good aquaculture practices

We should follow all the basic aquaculture practices, thorough removal of sludge and water sterilisation. It is important not to add even a single drop of untreated water to the pond before 60 days of culture, and to implement carrier exclusion measures from wild crustaceans, reptiles, birds and humans. Then,

- Start with, stringently selected post larvae (PL) which have been certified by a reputable laboratory to be free of IMNV virus. Be aware that once a specific pathogen free (SPF) PL leaves the hatchery, its SPF status cannot be guaranteed due to diverse challenges in the relatively open pond environment.
- Ensure biosecurity and reduce personnel visits, implement vehicle and footbath, and install carrier exclusion measures.
- Accord optimal water quality to the shrimp: sufficient dissolved oxygen (DO) of more than 4 ppm at any time, an ideal pH range of 7.8 to 8.2, an alkalinity of near to 120 ppm, sufficient minerals (magnesium, calcium) especially during rainy season and water salinity lower than 15 ppt.

Feeding

Use a reputable feed. In areas prone to IMNV, use a reduced feeding rate of cumulative 200 kg over 30 days for 100,000 PL. (During his extensive travel, the author has seen wide ranges of the first 30-day cumulative feed; from 165 kg to 450 kg per 100,000 PL, all with good results although the 165 kg regime will have slower growth but good water quality compared to 450 kg regime, in which shrimp grow very fast but diseases occur sooner).

Overfeeding will accelerate growth but will result in high organic load which in turn increases ammonia and hydrogen sulphide levels which trigger the blooming of pathogenic bacteria and phytoplankton. Vannamei will feed aggressively at high temperatures. At water temperatures of above 31ºC, the shrimp will overfeed resulting in high ammonia and organic load. Beyond 31ºC, it is advisable to use the feeding rate equivalent for a temperature of 30ºC to avoid excessive organic loading.

Suppressing Vibrio

The use of reputable probiotics to suppress *Vibrio* bacteria is important. The author has seen a farm which monitored and kept *Vibrio* below 1.0% of the total bacteria by daily addition of probiotics into the ponds. In addition, the technician top dressed the feed with *Lactobacillus*. The farm successfully harvested three consecutive crops with excellent FCR and survival of close to 90%. The cost of probiotics was below IDR 2,200 (USD 0.23) per kg of shrimp.

Another recommendation is to ensure that physically stressed shrimp are not returned to the pond. In Indonesia, we have this practice termed 'sampling goreng' (translated as fried sampling). This means that all shrimp that were cast-netted for sampling purposes have been stressed and are not returned to the pond. But rather, they are fried and eaten by workers. This is to avoid any horizontal transmission.

Concept of carrying capacity

Each farming facility because of the type of substrate, equipment available and age has different carrying capacity. When the carrying capacity of the pond is reached, it is best to either partially harvest to ease the carrying capacity or to totally harvest the pond, otherwise the shrimp will be persistently stressed.

With regards to density, it is recommended that we stock the pond with the density appropriate with the carrying capacity of the pond. Some farmers claim that polyculture with tilapia reduces the incidence of IMNV and WSSV. Small tilapia at low density are released into the pond when the vannamei are large enough to avoid being eaten by fish. Purportedly, the mucus of the tilapia inhibits the invasion and proliferation of pathogenic microorganism. Piscidins are antimicrobial polypeptides found on fish epidermis with broad spectrum activity against viruses, bacteria, fungi and parasites.

An Indonesian Ministerial Decree 17/2006 had allowed the drawing up of a National Fish Quarantine regulation to protect the country from further introduction of exotic disease through trans boundary movement. The regulation should be strictly implemented.

Control measures when stricken by IMNV

When the farm is infected with IMNV, the following control measures are recommended:

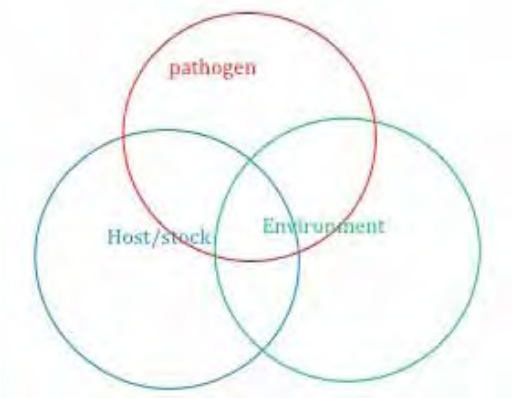
- Quarantine the pond that has contracted the disease and sterilise all equipment and tools that were used for the pond before using on other healthy ponds.
- Minimise excessive water change to reduce fluctuations of parameters such as salinity, pH and temperature which elevate stress.
- Increase aeration by adding more aerators to improve the water quality. Immediately decrease or stop feeding as uneaten feed will add organic load and increase ammonia.
- Apply molasses at 25% of feed per day or reputable probiotics to the feed and water and top dressing nutrients to the feed that enhances and activates the immune system, such as encapsulated vitamin C, chitosan, omega fatty acids, glucans, mannan oligosaccharides, phospholipids and astaxanthin and some minerals, magnesium , selenium and zinc.
- Avoid horizontal transmission by removing dead shrimp. In Indonesia due to regular siphoning, the centre of the pond is very clean. Some farmers modify the central outlet pipe to flush out the dead shrimp accumulated at the centre and collect the dead shrimp in a bag net placed at the outlet canal.
- Realise that the lunar cycle is very important in shrimp farming. Shrimp are most vulnerable during full moon and dark moon. So a few days before full moon or dark moon, improve the pond conditions by oxidising the excessive organic matter by the application of sodium percarbonate, followed by the addition of minerals and probiotics to improve the water quality.

Finally, when mortality worsens, it is best to carry out emergency harvest to cut losses.

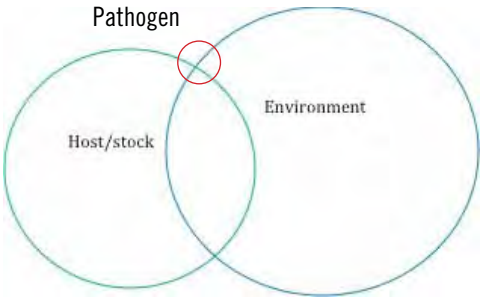
Technician Meryanto showing compressed air with breathing tool used in siphoning in Sumbawa Indonesia. Some workers can work under water and siphon up to 2 hours without surfacing

Conclusion

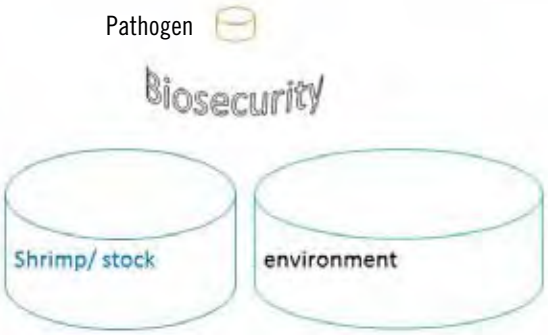
Snieszko had aptly illustrated the principle of disease prevention by his epidemiological triad:



The ultimate aim in shrimp health management is to reduce or dwarf the pathogen while optimising the environment for the shrimp and enhancing the health status of the stock via genetics and nutrition. Ideally we want to have a situation pictorially presented as below:



Finally, the goal should be biosecurity segregating the pathogen from the shrimp and environment.



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Raising the bar for PL production in Vietnam

By Zuridah Merican

The newest vannamei shrimp hatchery sets the benchmark for quality post larvae in Vietnam.

At the official opening of the hatchery. Jeff Jie-Cheng Chuang (third on right) with his Sheng Long & Hisenor team, from left, Maple Hung, vice president, Global Marketing, Francisco Velasquez, Bernando Jaramillo, Andy Watkins, Chen Ming Hsien vice president of Hisenor and Sam Hou, vice president, Vietnam marketing

Since 2008, the Department of Fisheries, Vietnam, now under the Ministry of Agriculture and Rural Development (MARD) allowed the culture of vannamei shrimp, initially in the northern and central provinces and later throughout the country. Vannamei shrimp production increased to 135,000 tonnes in 2010 (vietnamseafoodnews.com) covering an area of 25,397 ha, spurred by the supply of post larvae by industrial hatcheries around Cam Ranh bay in Ninh Thuan province which the government designated for the location of shrimp hatcheries. This article describes the upstream integration of aqua feed producer Sheng Long Bio-Tech International, one of the leading aqua feed producers in Vietnam.

The hatchery company, Hisenor Vietnam Aquatic Breeding Co Ltd is the latest to join the several industrial and backyard hatcheries and nurseries already operating in the central region to meet the current demand for more than 10 billion vannamei post larvae. An elaborate opening ceremony marks its entry into the post larvae business in Vietnam on August 4. Nguyen Huy Dien, the vice director general of the Directorate of Fisheries Vietnam and Tran Xuan Hoa, vice chairman of the People's Committee of Ninh Thuan province officiated the opening. In addition, invitees included Dr Shiau Shi-Yen, professor at the National Taiwan Ocean University, Dr Lo Chu-Fang and Dr Wang Han-Ching, from the National Cheng Kung University, long time clients and distributors of Sheng Long shrimp feed.

In his welcome address, Jeff Jie-Cheng Chuang, general manager of Sheng Long (or Thang Long as it is known in the Vietnamese language) said, "When we started the shrimp feed business, we had planned for a hatchery to complete our technical service to farmers. We have invested USD5 million in this hatchery project. Today, the industry in Vietnam, similar to that in several other countries in the region, continues to face early mortality syndrome (EMS). Recently, Dr Donald Lightner has identified the cause of the disease. Nevertheless, we are very much aware how important the environment and quality of post larvae are for the success in shrimp farming. The stability in seed quality is most critical and with the assistance of our consultants led by Andy Watkins, we can now provide stable quality and uniform size post larvae. All our brood stocks are 100% certified specific pathogen free (SPF)."

In her address, Tian Lee, vice chairman of China's Haid group said, "Sheng Long and the Haid group have been cooperating in this business in Vietnam. Our group is the second leading aqua feed producer in China and third largest in the world, and through Sheng Long, Haid will be expanding its aqua feed business into the markets in South East Asia. Hisenor is its first hatchery in Vietnam and taking off from here, Haid is looking forward to developing probiotics, post larvae production, and new farming methods for the industry in Vietnam."

According to Tran Xuan Hoa, MARD has designated Cam Ranh Bay as the area to centralise all the shrimp hatcheries because of the ideal weather conditions here; short rainy and long sunny periods. Investments into the hatchery business have benefited the local community. In its development plan, MARD has projected a demand of 33 billion post larvae in 2015 and increasing to 57 billion in 2020 (VASEP, 2012). A major distributor for Sheng Long said that in his experience, some 60% success in shrimp farming is attributed to post larvae quality and 40% on management and environment. He strongly believes that farmers can control the latter and hopes that Hisenor can provide quality post larvae to ensure a successful crop.

At the packing station, daily PL9 are counted and packed in small bags containing 2,000PL/bag and a capsule of activated carbon for delivery to farms

New logo and branding

At the opening, Chuang also introduced the new logo and branding for the Hisenor post larvae. There is also a name change for this aquatic business from Than Trinh VN to Hisenor. The logo reflects what the breeding team perceives for its future.

Currently, Sheng Long produces shrimp and marine fish feeds at its plant in Long An province. In 2012, despite the downturn in production, Sheng Long has increased its shrimp feeds sales and has planned for

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SYSTEM CERTIFICATION ISO 22000:2005 SGS

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Chuang, Watkins (centre) and Chen (right). The new Hisenor logo for the hatchery (extreme right) depicts the focus of the hatchery, blue on the right showing fast growth of industry with quality post larvae in the centre, with consideration for the environment in green on the left

an expansion of shrimp feed production from 60,000 tonnes per year (tpy) to 130,000 tpy. Both shrimp and marine fish feeds are exported to Malaysia, Sri Lanka, Brunei, Philippines and Indonesia. By early 2014, it expects to enter the market for freshwater fish feeds for tilapia, snake head fish and sturgeon at a new factory with an annual capacity of 60,000 tpy, also in Long An. The company produces feeds mainly for the vannamei shrimp under the brand names; Bi Tech, Tiger, Lion, Royal Dragon, Royal Panda and Baccarat. Feed production is governed by ISO 22000:2005. On the role of the company within industry in Vietnam, Chuang sees it playing an important role in improving farming technology and, through its marketing and technical services, providing comprehensive solutions: from aquafeeds, to post larvae and probiotic products. These will enhance farm efficiency, benefiting both the company and its customers.

Advanced production system for vannamei post larvae

As shrimp farming expands in Vietnam, industry groups and the authorities recognise that the lack of sufficient supplies of good quality post larvae is a threat to the future sustainability of the industry. As it stands today, post larvae quality depends on its provenance, be it from industrial hatcheries or backyard family hatcheries.

As the industry continues to suffer from EMS, now in its third year for most Vietnamese shrimp farms, farmers search for new sources and better quality post larvae. After almost 13 years working with shrimp farmers in Vietnam, Chuang's business model is for Sheng Long not just to have a hatchery, but a hatchery with an innovative production system which will provide post larvae both of consistent quality and at the quantities required by farmers. Rather than renovate an existing hatchery which it took over 6 years ago, Chuang decided to build a totally new hatchery from the ground up.

This was possible with the team of hatchery consultants, led by Andy Watkins. Watkins used his 25 years of operational experience and knowledge to plan a hatchery specifically designed for production of uniform size, fast growth and high disease resistance post larvae. According to Watkins, this hatchery is the culmination of unceasing improvement and upgrades by the team.

"This system combines the positive aspects of hatcheries in the US, Columbia, Indonesia, Vietnam, China and Taiwan," said Chuang. "Our emphasis is on controllable systems which give us the ability to standardise post larvae quality throughout the production cycle. We now have the best post larvae choice for the farmers to ensure successful crops. The strict biosecurity and temperature controls in this production system, with our husbandry feeding regimes, we can produce 8 mm post larvae (PL8) within 16 days. The length is the minimum PL length legislated for sale by MARD."

The hatchery, with a planned capacity from 2-3 billion post larvae (PL8), took 6 months to set up and has already sold its first batch of post larvae on August 1. Hisenor has positioned itself in the mid- range market with pricing at VND 83/PL (USD 3.95/1000PL) in comparison to the high PL prices of VND 85/PL (USD 4.00/1000PL) and cheaper post larvae by backyard hatcheries at VND 70/each (USD 3.33/1000PL) in the market.

A three phase production system

This starts with a unique water intake system. Water is drawn some 140 m out at sea and piped underground to the hatchery. Water in this system is taken at 1.5 m deep or less, depending on the tide. The sand acts as a filter; but, to prevent the intake of water at the muddy layer, there is a HDPE lining in place. Water treatment is through a sand filter, followed by bag filters of 5 microns and ozone. The water usage is 90-100 tonnes per day and filtration capacity is 50 tonnes/hour or down to 30 tonnes/hour at low tide. The efficacy of ozonation is monitored by maintaining ORP at 400-500 mV.

"We have introduced the most developed water treatment, filtration and recirculation system. Therefore, we are able to provide stable water quality in the production system which is not influenced by any change in the external environment," said Watkins. "We use probiotics to maintain a pathogen free environment and do not use any antibiotics."

The hatchery is spread over 1.5 ha of land with separate buildings for water reservoirs, maturation and spawning, larval culture, nursery, live feed production and laboratories. The highest quality SPF brood stock is used. These are mainly imported from SIS, Singapore and each batch will go through an acclimation period of two weeks in the photoperiod controlled room with eight units of circular maturation tanks. Each tank will hold 160 brood stock. Spawning ratio is 1:1 male:female.

Chen Ming Hsien, vice president in charge of the Hatchery Project for Sheng Long, said, "Our production is continuous. Every day, we stock nauplii (N5) into the larval tanks. We have five larval rearing rooms, each with four tanks of 40 tonnes capacity. Temperature is maintained at 33-34ºC. In full production, each of these rectangular tanks with u-shaped bottoms can hold 10 to 12 million nauplii each at a density of 250 N5/L. Feeding is with algae *Thalassiosira* as well as artificial feeds. At PL4-5, post larvae are harvested using a mesh net, counted, disinfected and transferred to the nursery unit."

"The nursery unit has 10 dark grey coloured circular tanks, each holding 60 tonnes of water. PL4-5 is stocked at a density of 100 PL/L. This is the last stage before harvesting at PL8 to PL10. Each of these tanks can hold 10 million PL5 but at the moment we have only 30 tonnes of water to hold only 2-3 million post larvae but we will be increasing stocking step by step. The reason for the dark grey colouration is to make the PL more stable. Feeding is with a benthic algae as well as artificial feeds."

A separate live feed preparation unit has rectangular tanks with curve corners and a separator in the middle for a circular water flow. The difference from the normal is a paddle wheel which moves the water, instead of the commonly used bottom aeration. This keeps the algae in suspension in a gentle manner and prevents breakage of the cells. The pure cultures of the two types of algae used in the hatchery are purchased from the US but Chen said that a local university is able to supply them with the new algae. In both cases, they will have to clean up the algae following their biosecurity protocols.

"On quality control, we have 14 index points to check including those for necrosis, hepatopancreas condition and foreign bodies. Our

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stress test is to keep post larvae in freshwater. We adjust salinity when there is a demand. Regular checks with the PCR (Polymerase Chain Reaction) is done to confirm our post larvae are free of any infectious virus diseases," added Chen.

The Hisenor advantage

In a comparison of production systems, Chen who started his hatchery work with Uni President Vietnam said that his earlier experiences have been with working with experts from Taiwan and other parts of Asia.

"I find that this technology that we are now applying in Hisenor hatchery is based on science, with accurate calculations. We have proper data recording. I am very sure that the post larvae that we produce are of good quality. After ablation, we use the brood stock for only 3 months. Although the older brood stock may be able to produce, they have poor resistance and poor nauplii quality."

According to the team, an advantage of their system comes from the design of the hatchery which makes it easy for its three stage operations and reduces the risks of errors and variability in product quality. The large tanks for almost all of the processes, allow them to control precisely the work activities in the nauplii and larval rearing, standardise larval quality and simplify management. The strict level of biosecurity within the standard operating procedures (SOP) permits a greater biological control. The recirculated water treatment allows a control of parameters and stabilises nauplii production.

"This high density algae culture system with fewer transfers between volumes also permits better quality control. We only use top quality artificial feeds and coupled with large tanks, we observe uniformity in size. In fact, our strict temperature controls, feeding and husbandry in larval culture enable us to produce an 8 mm post larvae in 16 days as opposed to 20 days in traditional systems," said Chen.

Stable and quality post larvae

"Today in Vietnam, we have also compiled the best management practices in terms of biosecurity standards to prevent infection from external and internal sources during each production step. The nutrition and feeding of brood stock and post larvae are monitored scientifically. Therefore, I am confident that my team and the Hisenor team can ensure the reliability and quality of the post larvae," said Watkins.

"Our ability in providing stable quality and quantity post larvae is what is most relevant for the industry. Most post larvae are known as 'quality seeds' by farmers but they do vary in quality due to the lack of stability. In Hisenor, we explore every possibility and make every effort

to ensure that we can produce stable and excellent quality by adopting close monitoring and quality control in each step of the production chain.

"For hatchery producers, my message is that as far as possible, instead of quantity, we need to concentrate on consistent post larvae quality, biosecurity, and nutrition for the business to thrive. We need to remember to keep the quality completely under control. We have done this in Indonesia and now we are doing this in Vietnam."

PL4 are harvested and transferred to post larval rearing room

Availability of amino acids in aqua diets

By Andreas Lemme, Cláudia Figueiredo-Silva, Christoph Kobler and Stefan Mack

The nutritional value of feedstuffs in meeting the animal`s nutritional requirements is greatly determined by nutrient digestibility. In the case of amino acids, fish utilise supplemental free amino acids as efficiently as protein bound amino acids. In this two part article, the authors look at current information on supplemental free amino acids and their sources with regards to their digestibility and availability in fish. The first part discusses research showing that free amino acids are 100% digestible.

Part 1: Digestibility and availability of free amino acids

The task of commercial nutritionists is to formulate the most cost-effective feed which meets defined nutrient specifications under given economic conditions and access to ingredients. Both nutrient specifications and nutrient contents in raw materials should be set and used in such way that their digestibility and availability are considered. To do this well, they will require accurate information of feedstuff nutrient composition and availability to the fish. Only that portion of nutrients which is digested and absorbed will be available for metabolic functions and growth of the animal thereby defining the nutritional value of an ingredient.

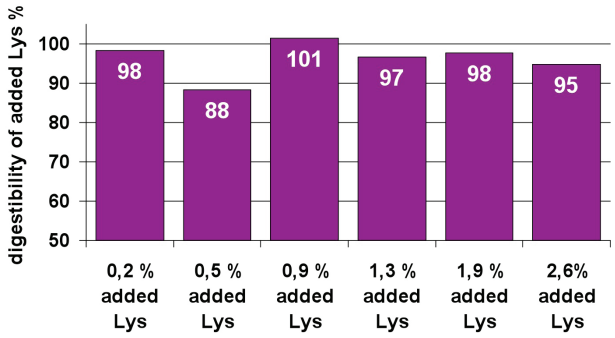
With respect to amino acids, digestibility determination is always accompanied by a certain degree of variation because of for example, differences between individuals in terms of digestion efficiency as well as differences between batches of the same feed ingredient. In addition, digestibility numbers are also influenced by the location where the assays were conducted because surrounding conditions play a huge role even when applying the same method such as 'sedimentation' or 'stripping'.

Digestibility of free amino acids

Free amino acid sources such as L-lysine, L-threonine or DL-methionine have been tested in numerous studies and proved to be 100% digestible. For example, digestibility of graded levels of supplemented L-lysine from Biolys®, a lysine sulphate source, ranged between 88 and 101% in Atlantic salmon in a study conducted by Espe *et al.* (2007, Figure 1). Taking methodological inaccuracies such as ignoring the impact

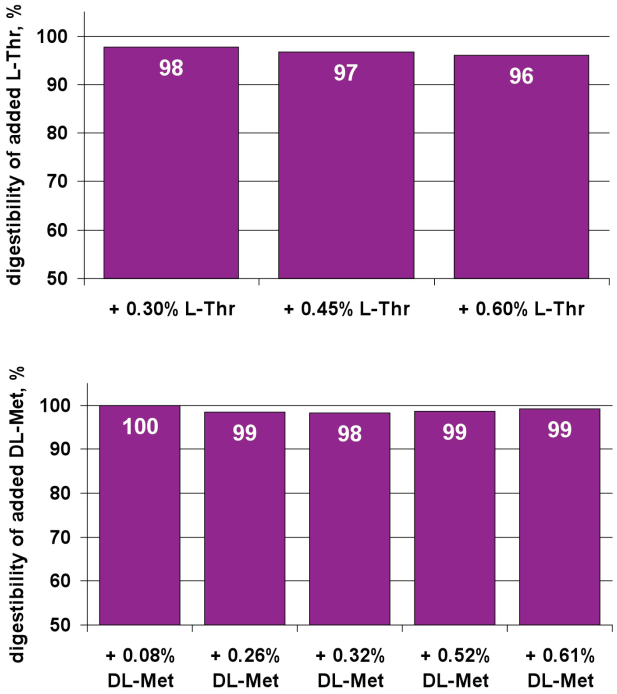
of endogenous lysine losses (originating from digestive enzymes or sloughed cells) into account, it was concluded by the authors that the supplemented lysine was completely digestible. This is in agreement with earlier data by Rodehutscord *et al.* (2000) indicating an apparent digestibility coefficient of above 99% for L-lysine coming from L-lysine sulphate and from L-lysine HCl in rainbow trout.

Figure 1: Digestibility of lysine from supplemented lysine sulphate in Atlantic salmon suggest complete availability (Espe *et al.*, 2007)



Follow-up studies by Espe *et al.* on L-threonine supplementation (unpublished) and DL-methionine supplementation (Espe *et al.*, 2008) in Atlantic salmon also revealed complete absorption of L-threonine and DL-methionine as shown in Figure 2.

Figure 2: Digestibility of L-threonine (left) and DL-methionine (right) supplemented at graded levels to salmon diets (Data obtained from trial reports and Espe *et al.*, 2008)

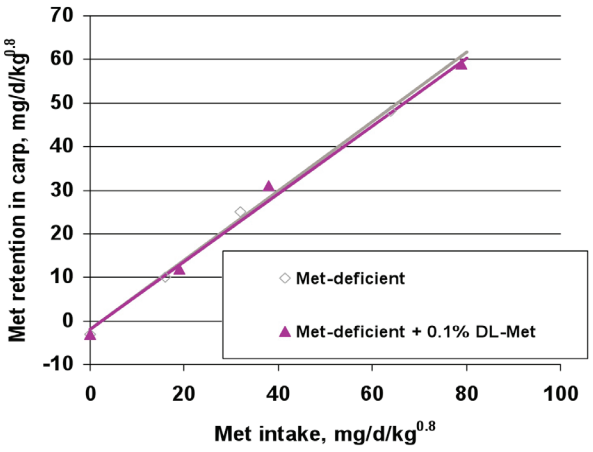


Availability means more than digestibility

While digestibility explains the availability of amino acids to a large extent, questions about the utilisation of absorbed free amino acids especially compared to protein-bound amino acids remain. It is often assumed that utilisation of free amino acids is reduced relative to that of protein-bound amino acids which is explained by their rapid absorption being evidenced by an earlier peak of concentrations in plasma. Such data have been reported by e.g. Ambardekar *et al.* (2009) in channel catfish and Schuhmacher *et al.* (1997) in rainbow trout. On the other hand, as recently summarised by Lemme (2011) and Zhu *et al.* (2013) numerous studies using crystalline amino acids, such as dose-response studies with many aqua species showed strong responses suggesting a highly efficient utilisation for optimising performance.

Recently, feeding trials were conducted to examine the efficiency of utilisation of dietary methionine of diets either not supplemented or supplemented with 0.1% DL-methionine (Lemme and Elwert, 2012; Lemme *et al.*, 2013). Slope ratio technique was applied where the slope of regression lines indicate the efficiency of utilisation. Figure 3 shows for both experiments that slopes did not differ between supplemented and unsupplemented diets and, thus, provides clear evidence that the supplemental DL-methionine was as efficiently utilised as methionine coming from intact protein. Accordingly, regression analysis indicated that efficiency of methionine deposition was 78-80% in common carp and 65-68% in red hybrid tilapia.

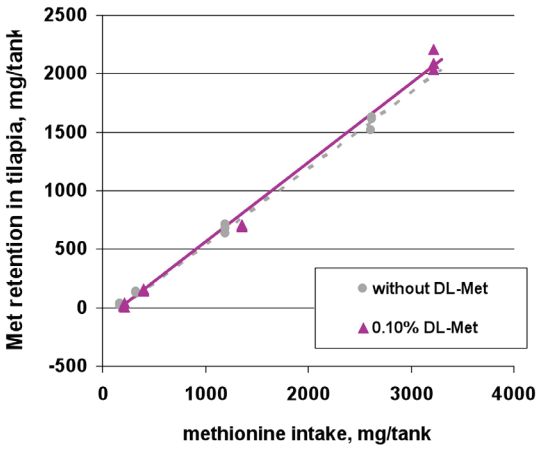
Figure 3: Impact of increasing methionine intake on methionine deposition in body protein of juvenile common carp (left, obtained from Lemme and Elwert, 2012) and red hybrid tilapia (right, obtained from Lemme *et al.*, 2013) which were fed increasing quantities of either an unsupplemented, methionine deficient diet or the same diet supplemented with 0.1% DL-methionine.



Y = -2.01 + 0.798 Met-def + 0.780 DL-Met

Relative efficiency:

Met-def: 100%
DL-Met: 98%
(Conf. Interv. 87% – 108%)



Y = -119 + 0.652 Met-def + 0.678 DL-Met

Relative efficiency:

Met-def: 100%
DL-Met: 104%
(Conf. Interv. 99% – 109%)

References are available upon request from the authors

Next in part two, the authors look at nutritional value to achieve consistent animal performance and discuss the efficiency of two methionine sources.

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Inclusion of enzymes can reduce cost and environmental impact of vannamei shrimp production

By Orapint Jintasataporn, Natchanok Amornthewaphat and Tiago Santos

Phytase and fiber-digesting enzymes are routinely used in poultry and swine production, but still have limited use in aquaculture. Two major reasons for the limited use in shrimp production are the denaturation of the enzymes by extrusion processing and the low inclusion of vegetable ingredients in these diets. On other hand, the inclusion of vegetable ingredients in shrimp feeds is usually limited due to the potential negative impact on growth performance and immune system of these animals.

A trial was designed to assess to what extent the inclusion of higher levels of vegetable ingredients impact shrimp performance and immune status, and if the inclusion of phytase (Quantum Blue) and xylanase (Econase XT) could help alleviate these effects.

A group of vannamei shrimp *Penaeus vannamei* (average weight 7g) were divided between twenty 240L glass aquaria, in brackish water with 12 g/kg salt and 70 individuals/m^2, resulting in 4 replicates (aquaria) per treatment. Treatments included a control diet with low soybean meal (Control), a diet with the same nutritional level but 50% higher soybean meal inclusion (HS) and the same diet including 24000 BXU/kg Econase XT and 500 (HS+500/24), 1500 (HS+1500/24) or 4500 (HS+4500/24) FTU/kg Quantum Blue (table 1). Inclusion of higher soybean meal inclusion reduced the cost of the diet due to the lower cost of this ingredient compared with fish meal and wheat flour.

Weight gain (WG), feed consumption (FC), feed conversion ratio (FCR) and survival rate (SR) were recorded. Shrimp were fed 3 times per day and uneaten feed was collected, dried and weighted for feed consumption determination. Immune status was determined by phenol oxidase activity (POA, U/mg), total haemolymph protein (TP, mg/dl) and total haemocyte count (THC, 105 cells/ml) at the end of the 4 week trial.

Dry matter, calcium and phosphorus digestibility were determined using chromic oxide as a marker (1% inclusion). Mineral excretion values were calculated based on the levels presents in the feed and the calculated digestibility.

Although not significantly different, higher soybean meal inclusion diet reduced shrimp body weight gain (BWG) by 30% and increased FCR by 20%. Growth performance recovered with Econase XT and Quantum Blue inclusion; inclusion of 24000BXU Econase XT/kg and 1500FTU Quantum Blue/kg recovered BWG to 97% of the control and FCR was improved by 2.5% over the control.

This decrease in performance can be explained by the anti-nutritional effect of higher soybean meal inclusion on the immune status and nutrient digestibility in shrimp. Shrimp fed higher soybean meal had lower POA, TP and THC than those fed the control diet; supplemental Quantum Blue and Econase XT significantly improved immune status, to a level similar to that in the control group (Table 2).

Dry matter and phosphorus digestibility were also reduced by the inclusion of higher soybean meal in the diet, with values restored by Quantum Blue and Econase XT inclusion (Table 3). Phosphorus digestibility by white shrimp fed Quantum Blue (1500 FTU/kg) and Econase XT (24000 BXU/kg) was statistically higher than those fed a control diet with high fish meal inclusion. As a consequence of this higher digestibility, the calculated excretion of calcium and phosphorus was reduced by 10% and 20%, respectively, when 24000 BXU/kg Econase XT and 1500 FTU/kg Quantum Blue were included in the high soybean meal diet compared to the control diet with high fishmeal inclusion (Figure 2). This demonstrates an opportunity to reduce the pollutant effects of white shrimp production on the environment.

Conclusion

Supplemental phytase (Quantum Blue) and xylanase (Econase XT) in shrimp diets (34% crude protein) with high soybean meal inclusion can maintain growth rate and immune status to that of a control diet with high fish meal inclusion, while reducing the cost of the diet. Higher dry matter and phosphorus digestibility in diets with Quantum Blue and Econase XT may also reduce the excretion of nutrients and thus the pollutant effects of white shrimp production on the environment.

Table 1: Feed formulation

Ingredient	Control	High soya
Fishmeal - Tuna, %	25.0	15.0
Soybean meal, %	25.0	38.0
Squid liver powder, %	3.0	3.0
Squid meal, %	3.0	3.0
Wheat flour, %	27.0	21.8
Tuna oil, %	1.0	2.0
Soy oil, %	2.4	2.0
Squid liver oil, %	1.0	1.0
Soy lecitin, %	1.0	1.0
Lysine HCl, %	0	0.15
Monocalcium phosphate%	4.0	5.3
Others, %	7.6	7.75
Crude Protein, %	34.3	34.2
Crude Fat, %	7.42	7.48
Crude Fibre, %	2.35	3.20
Calcium, %	2.64	2.47
Phosphorus, %	1.86	1.86

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Figure 1: Weight gain and FCR of shrimp fed control, high soybean meal or high soybean meal diets supplemented with Quantum Blue and Econase XT

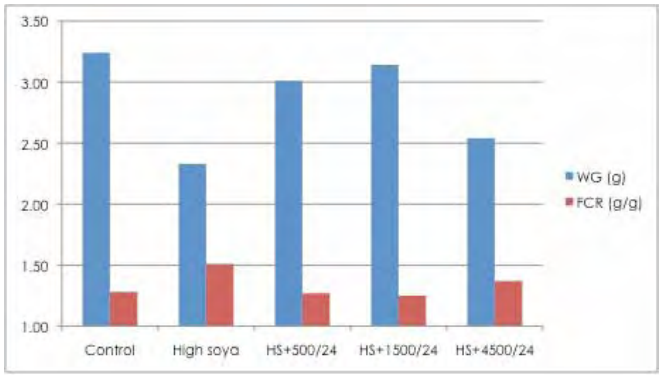

Figure 2: Calculated mineral (Ca and P) excretion of shrimp fed a control or high soybean meal diet supplemented with Econase XT and Quantum Blue

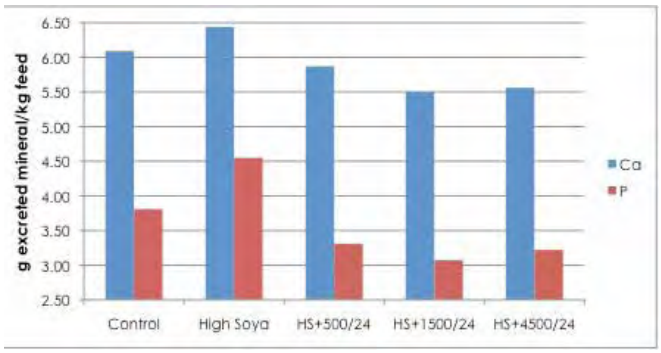

Table 2: Immune status of white shrimp fed diets supplemented with Quantum Blue and Econase XT

Treatment	Control	High soya	HS+500/24	HS+1500/24	HS+4500/24	P
POA (U/mg protein)	172[a]	129[b]	146[b]	172[a]	168[a]	0.001
TP(mg/dl)	2.84[a]	2.42[b]	2.78[a]	2.97[a]	2.77[a]	0.028
THC (105 cell/ml)	15.6[a]	12.7[b]	14.2[a]	15.8[a]	15.5[a]	0.002

Data in the same row with same superscript are not significantly different (P>0.05)

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Taking Asia's finfish aquaculture to the next level of development

Part 1. The challenges of intensification; from domestication and genetics, hatchery management and developing ideal feeds

For several of the 181 industry stakeholders attending the Third Aquaculture Roundtable Series (TARS 2013), be it for the first, second or third time, the gathering gave them an opportunity to network and offer their views on how to move Asia's finfish industry forward. Designed as a series of roundtable sessions, the first TARS focused on aquaculture feeds and feeding, while the second on the value chain of the shrimp aquaculture industry. This year, the finfish aquaculture sector took its turn from 21 to 22 August in Singapore with the theme: *Industrialisation and Sustainability.*

There is a large range in production methods in Asia for the major commodity species such as the tilapia, pangasius catfish and Asian seabass, and for the niche market species such as groupers, snappers and pompano that vary, both geographically and species-wise. The challenge for Asian producers is how to take it to the next level, that is, industrialised fish farming to meet the future challenges of global markets, and at the same time, ensure the sustainability of the industry from the economic, social and environmental perspectives. This was the premise behind TARS 2013's focus on finfish aquaculture.

Speakers during the session on Breeding and Hatchery Management, from left, Dr Alessandro Moretti, Frank Tan, Tan Kay Heok and Dr Morten Rye.

The meeting attracted participants from the academia, public and private sectors, including chief executives and managers to technicians of integrators, farms, hatcheries and feed additive companies. A majority of government personnel and academia from Singapore were in attendance. TARS 2013 came after a recent event, the Aquaculture Industry Engagement day which was held at Republic Polytechnic (see page 52).

As with the last two successful roundtable series, TARS has become one of the industry's foremost opinion-leading aquaculture events in Asia. A host of international experts facilitated the plenary and breakout sessions, which are hallmarks of this critical series. The 17 speakers, all experts in their relevant fields, presented updates on genetics, intensification and controlled hatchery operations in Asia and Europe, as well as health management, production models, health and environment, feed and feeding, and marketing and sustainability.

The plenary sessions set the stage for the breakout group discussions, namely: *Breeding and Hatchery Management; Production, Health and Environment; Feeds and Feeding; and Marketing and Sustainability.*

Dr Jacques Gabaudan (left), DSM, Thailand with Bai Zemin and Mithun Sukumaran, Temasek Polytechnic, Singapore

Ng Yih Chen, Oasis Aquatic Malaysia, (right) with Dr Yang Huey Lang, Taiwan, Merit Ocean Biotech, Taiwan

During the interactive breakout sessions, participants who were grouped according to their areas of interest, analysed both immediate and emerging challenges impacting the finfish aquaculture sector, and identified priority areas and strategies to address industry concerns.

The meeting followed the general *modus operandi* for TARS. The first day and a third of the second day were devoted to the 'state of the industry' with presentations from experts and industry leaders providing overviews. This formed the starting point for the breakout sessions which occupied the rest of the second day. Group leaders and facilitators led discussions at each roundtable and the results from each industry group were then consolidated and deliberated in an interactive panel discussion that was open to all participants to encourage cross fertilisation and to identify the requirements to 'move the industry forward'.

This concept was jointly developed by Aqua Research and Corporate Media Services, organisers of The Aquaculture Roundtable Series (TARS).

Sponsors for TARS 2013 included Nutriad, Inve Aquaculture, Aquativ, DSM, Lallemand, Alltech and Biomar. It was supported by the Agri-Food and Veterinary Authority of Singapore (AVA).

Breeding and hatchery management

In farmed fish and shrimp, this is where domestication and genetics can play a major role in increasing production, said **Dr Morten Rye**, Akvaforsk Genetics Center, Norway. His presentation on 'Domestication and Selective Breeding in Asia: The Tilapia Model and Implications for the Marine Fish' was based on lessons learnt from the more than 30 years of genetic research on the salmonids and from 25 breeding programs covering 15 species and 15 countries. As a backdrop, Rye compared the developments resulting from domestication and selection in the broiler chicken and pigs with that in aquaculture. Aquaculture species generally out-perform livestock species when it comes to the rate of genetic improvement "This tells us that we have significant potential. However, only for the Atlantic salmon is there currently 100% use of stocks from well-designed genetic programs. But sadly, for aquaculture species in general, close to 90% of the production depends on wild or undomesticated brood stock."

"Technologies have changed in aquaculture and we have significant improvements in overall production efficiency, reduction in days to harvest and feed conversion efficiency. The key to further improvements is genetics as we can only optimise management to a certain level. But only when we get the genetics right, can we have continuous improvements and only if we maintain genetic variability, balance selection intensity with maintaining genetic variance."

Hung Cheng-Yen (left) and Nguyen Vu Thanh Nguyen, UPVN Trading, Vietnam and Dagoberto Sanchez, Novus, USA

Rye commented that from a genetic point of view, fish have several advantages from high fecundity where a single pair can produce a very high number of offspring to external fertilisation which allows for tremendous possibilities to modify and optimise and design a selective breeding scheme. All these are beyond what is possible in livestock. "However, we must decide which species will be the target for the next generation. Without controlling reproduction and domestication, genetic selection is not possible. In the livestock industry, there are less than 10 species which industry focused for more than 100 years, whereas in aquaculture FAO reported 240 species under culture and perhaps we can work on the 13 top producing species in Asia."

The industry standard for genetic improvement in aquaculture is family based (sib selection) breeding programs. Worldwide there are currently more than 100 programs in operation, covering more than 20 species of fish and crustacean species.

The tilapia

"Almost all of the tilapia commercially produced today has some link to the pioneering GIFT project run by ICLARM, AKVAFORSK and several collaborating institutions in the Philippines in the late 1980s and 1990s. When the GIFT project initially compared the growth performance of the domesticated commercial stocks farmed in the Philippines in the late 80s against material from wild native stocks in Africa, they were not performing any better. This demonstrated clearly that something was very wrong with the way farmed stocks of tilapia were handled at that time. Stocks were often subject to unintentional hybridisation and inbreeding resulting in loss of genetic variation and deteriorating performance due to inbreeding depression. Early experiments also revealed that the level of heteros is (hybrid vigour) resulting from crossing of strains were generally low."

The approach followed in the GIFT project was therefore to establish a combined family and within-family selection scheme for improving growth following the model successfully applied in salmonids, using a base population consisting of genetic materials from all available stocks (four farmed and four wild African). Over the next five generations, this effort resulted in a selected stock that grew almost twice as fast as compared with the original base material. These results were consistent with what has been achieved in Atlantic salmon in Norway. Due to the much shorter generation interval in tilapia, five cycles of selection could be done in only five years as compared to the 20 years it took for Atlantic salmon. The implications

Feeds and Feeding Roundtable discussion

are very significant. Exemplified with a base material growing to 600 g in 8 months this rate of improvement imply that after five generations of selection, the fish may be harvested at 1.2 kg after the same production time, or at the target 600 g after less than 6 months. Such improvements lead to major reductions in production costs and overall risks, and are critical for establishing cost-effective operations.

On the choice of target traits, growth is the most common for the tilapia and other species. As programs and industries mature, however, additional traits are targeted for selection such as general survival, yield and carcass quality traits, and disease resistance. In his presentation Rye also reported on work in Hainan, China on the Nile tilapia for fast growth and fillet yield, blue tilapia for cold tolerance and red tilapia for salinity tolerance.

His take home message was, "Sound domestication and implementation of well-designed selection programs are critical for the development of sustainable and cost-effective aquaculture productions. We have to be careful of spreading our resources. We need to focus resources and lift the target species to a certain level of genetic quality and be sure that the domestication process is done correctly."

Monoculture and intensification

Italian **Alessandro Moretti**, Inve Aquaculture has 30 years of experience in fish hatchery operations in the Mediterranean, as employee and owner of hatchery and adviser to large organisations. In his presentation on "Intensive hatchery management: Monoculture production and learning from the Mediterranean experience", he reviewed the changes in the fish hatchery sector in Europe. Fry production of European seabass and sea bream sector is increasing. "The number was 76 hatcheries in 2009 and down to 71 hatcheries today but the production has increased to 1.085 billion/year in 2013 from 1.05 billion in 2009. This is a €220 million industry for a 340,000 tonnes of fish valued at €1.6 billion. Larger hatcheries with more than 35 million/year production are growing. This shows that the trend is intensification rather than investing in new equipment and buildings.

"Now there are two major players - Greece and Turkey with 70% production. Hatchery technology was developed in France and Italy. This shows us that technology can be transferred and perfected and often does not stay in the country of origin.

"Production is 50:50 of European seabass: gilthead sea bream. In Europe, the search for new species has been going on for decades. We have been researching the technology for flat fish fry production for the past 10-15 years. Production is still very small despite this. There are also other species with low production volumes. The indication is that we should concentrate on fish which are easy to grow and that we know well."

Bjorn Myrseth, Vitamar, Norway (left) and Soo Man Heng, Australia. Myrseth presented on production models, value chain, consolidation and investor outlook

"Most of larval rearing uses the green water technique which is most complete and less stressful to the fish. The clean water method using only *Artemia* as live food is used only for the seabass, with dark conditions and low temperature. Larvae are stocked at 100-120 larvae/L. Nowadays we do not put the eggs in larval tanks as eggs pollute the water and bring about infections. We have learnt that brood stock is not just adult fish. Now we are paying more attention to the brood stock from the feed point of view. The goal is to explore its production potential from the beginning."

During the first 30 days, Moretti said, "I personally trust the green water technique and a homogenous environment with good algae, rotifers, *Artemia* and good enrichment. More than 90% of total mortality from 0 to 90 days occurs during larval rearing and if you are successful in larval rearing, you have succeeded quantity wise in the final production.

"In intensification of production, the rule is to remember that the fish is in an artificial environment. Do not imagine that you want to give the fish natural conditions as this is never true! In a hatchery design, from a professional point of view, the flow among production units is most critical. Intensification requires prevention of pathogen especially when antibiotics are prohibited. This can be obtained by adopting strict hygienic protocols and helping the system with the use of probiotics. Next is quality, which requires some strict rules. The average survival for seabass during 150 days is around 30% but the high peaks showed a potential at 70% which has to be improved further. Correct swimbladder inflation is 90% but opercular complex deformity continues to be problematic for the sea bream. The average loss of fish is 6% which came down from 12% but this is still a high cost for the farmer. Spinal deformities are mainly due to hydrology."

In terms of economics, the trend is lower costs with high survival. Prices have dropped 30% when production increased 20 times but in actual terms, it has dropped from € 2.4 each to € 0.20. Among the cost components, the main cost is *Artemia* at 32% but it appears that dry feeds are becoming as important as *Artemia*. The rise in costs for health can be foreseen for the future and is because of more emphasis. The market strategy is now to ensure fry quality in the farms. This is how to reach the target FCR and prevent diseases. The 15% mortality of fry in the early grow out is not acceptable by growers.

His take home message was, "Intensification is the direction to achieve quantity and sustain quality and we have to expand this to be compatible with local conditions, financial resources and our tendency to apply black and white solutions."

State of the art hatchery

In their joint presentation, **Frank Tan** and **Tan Kay Heok** of Marine Life Aquaculture talked on their journey in developing a hatchery for pre vaccinated Asian seabass in urban Singapore. From a small hatchery in 2009, on mainland Singapore, it has now expanded into a biosecure facility on an island. Production of seabass for 2012-2013 is now in full swing with 4 million of 1 g fry, 1.2 million of 12 g and 600,000 of 30 g fingerlings. They also produced 3.6 million of the four- finger threadfin and 0.5 million of golden trevally during the same period.

"Essentially, in this rather competitive business, we had to show that we are ahead, think globally and keep our operations lean as we are in Singapore with higher costs of labour and utilities. Keeping up and learning from international practices of marine fish hatcheries have helped us to have high productivity and efficiency. We saw that in Norway, they have smaller number of staff but productivity is high. Technology and facility-wise, what we have, we have developed through innovation," said Frank.

Tan Kay Heok continued with an explanation of the quality fry produced at the hatchery. "The biosecurity setup is critical as we need to have full control on the prevention of diseases, horizontal or vertical transmission. There should not be any disease incidence from egg to market stage. Disease screening is carried out from egg to pre-vaccinated fry by an outside laboratory. We use the (clear) water system. Our selling point is the vaccination of 2 g fry by immersion and 30 g fingerlings by injection. The first grading is at 15 days and nursery grading is every 4-5 days, discarding slow growth fish.

"We have tested that vaccinated 30 g fish really perform well in open waters. We do our own selection for fast growth using brood stock from local and outside sources. We also operate with a group doing some DNA selection.

"Our core business is a hatchery and we target 15 million fry by 2014 but we also need some downstream support. We have cage farming facilities close to the island and will soon develop deep net cages to grow larger seabass of 2.5 to 3 kg." said Frank.

Feeds and feeding
Towards ideal finfish feeds

In the session on the current situation and future of finfish feeds and feeding, Dr Brett Glencross from CSIRO Food Futures Flagship, Australia, began with an introduction on the ideal specification of fish feeds in his presentation on "Beyond a vision of 2020: The future of the ideal aquaculture feed in Asia". There has been a quantum leap over the last 5-10 years and most 'ideal' specifications are now relatively well known and can be modelled for a range of species and at any stage of the grow-out production. However, there remains a challenge with fish meal and fish oil resources which cost higher than ever before and this places pressure on the need to improve our ability to use alternative oils and proteins.

The Philippines group, from right, Levy Manalac, USSEC, Prof Valeriano Corre, Christopher Co and team from Overseas Feeds and Ariel Tan Santana Equities

In an example of how progressive our modern understanding on nutrient demand has become, Glencross showed a nutrient-demand or flow-model (depending on the nutritionist's approach) and highlighted that the final critical outcome of either interpretation is growth. For a more simplistic approach, Glencross gave an example of a classic bioenergetics model and discussed how such models have also been used to define ideal requirements in modern diets. In the ideal diet specifications, he said, "At 30 °C, a 100 g Asian seabass will gain 2.9 g per day but it needs 38 kJ/day to achieve this. When a feed is arbitrarily formulated to contain 19 kJ/g of digestible energy, the fish will need 2 g/day of that feed to satisfy its energy demand. Similarly, estimates of protein demands indicate that a fish of this size at this temperature will require 1 g/day of protein. Therefore 1 g/day of protein in 2 g/day of feed logically leads to a scenario where the diet should be 50% protein and the feed ration is 2 g/day." Examination of the relationship between protein and energy demand shows that at this fish size and temperature, there is a protein demand of 27.4 g/MJ. However, Glencross pointed out that this was just an example of one species, one size and one temperature and all these factors can be examined to better understand a suite of complex inter-relationships underpinning nutrition.

Session speakers on Feeds and Feeding, from left, Dr Philippe Sourd, Michel Autin and Dr Brett Glencross

On ingredients, Glencross said that being dependent on one ingredient such as fish meal is a risk because of supply and price volatility, and potential contaminant issues. Fish meal is now priced at USD2,000/tonne and is not expected to be cheaper in the near future.

"Nutritionists should invest in a range of raw materials but also need to understand the potential benefits and risks of the different ingredients, learn to use them well and with confidence and that this will be underpinned by a more broadly adopted method to standardise assessments of raw materials across both industry and academia. When you start formulating on the basis of digestible nutrients, amino acids and energy, you increase your ability to become more adaptable to alternative ingredients and this will allow you to start dropping fish meals and increasingly use other alternative meals. This clearly opens up more opportunities. We have now reached levels of being able to consistently use only 15-16% in seabass diets without sacrificing performance and soon will be able to use less than 10% by 2020 and are aiming for zero by 2033."

Matching feeds with new genotypes-the Ferrari analogy

"Recent evidence also showed that genetic selection is influencing the specifications needed to formulate the ideal feed. In a study with

Dan Fegan, Cargill Thailand

Prof Ng Wing Keong, University Sains Malaysia

Misai Tsai, PT Lucky Samudra Pratama, Indonesia

selected monodon shrimp, growth was 1.8 g/week versus less than 0.6 g/week with the same diet fed to satiation to unselected shrimp. But when fed a high-specification diet, growth improved to 2.5 g/week and 1.2 g/week for the selected and wild genotypes respectively. Similarly, we will need to develop different diets for tilapia and for the supercharged GIFT tilapia. Morten Rye and I have come up with this analogy that as we start selecting for higher performances, we will start building 'Ferraris' which means we need Ferrari parts to build this performance, not 'Volkswagen' parts. We need to formulate diets that allow the animal to reach its full potential," said Glencross.

His message was; "Our ability to tailor diets to more precise specifications will require that we have a better understanding of nutrient demands and their intrinsic inter-relationships. In the future more diets will be based on their digestible nutrient and energy specifications. Additionally there will be alternatives such as genetically modified rapeseed or canola, microalgae, functional feeds for specific functions, bio actives and other performance driving additives. But, being adaptable to emerging challenges will be the key to survival."

Performance feeds

"The growth in aquaculture is expected to continue but dedicated feeds and feeding strategies have been developed for only 5-10% of the farmed species. There is a need for more efficient diets in all major species and need for a more structured approach in developing feed," said **Michel Autin**, Biomar, France. He presented on the evolution of performance feeds from marine fish to the tilapia. Some years back, Biomar established a new approach to develop fish feed which basically considers nutrients and energy needs of a given species at a given development stage and to reach a preset performance. From 2008, this method has been deployed for Atlantic salmon, rainbow trout, European seabass and gilthead sea bream. With a new factory in Costa Rica dedicated to tropical species (tilapia and shrimp), the concept has been applied to tilapia (*Oreochromis niloticus*) feed development from 2011.

"The performance concept is a tool for targeted feed conversion ratio (FCR) and specific growth rate (SGR). It is defined where the feed is formulated to have a potential performance and is not defined by the raw material composition of feed and fixed crude nutrients and gross energy values. Here feed ingredients may change, nutrient content will change but the performance is fixed, in terms of potential FCR and potential SGR. In turn this potential is determined by fish genetic background, environment and farming practice," said Autin. "You will also need to know the available amino acids and digestible energy"

Autin went on to describe in detail the development of tilapia diets using the performance concept. It started with analysis of the main raw materials, full body composition of tilapia, and optimal digestible protein (DP)/digestible energy (DE) values for fish growth, assessment of preferred energy source, essential amino-acid requirements and finally the application of these results to establish and test a dietary matrix of commercial formulations of varying DP and DE levels linking feeds to feed performance (FCR and SGR) and harvest yield (gut loss and fillet yield). Some salient points shown were that the essential amino acid requirement focused on lysine which for high performance feed, was much higher than the NRC (2011) figures of 1.1-1.9% for standard feeds.

Functional nutrition

The rise in functional feeds was mentioned by Glencross as the future to give greater control over growth rate, product quality, health and reproduction. How can functional nutrition be used to sustain high fish and feed performances was dealt by **Dr Philippe Sourd**, Aquativ.

He said that in a holistic approach, the performance of fish farms is measured not only in terms of growth, survival or FCR but also biological aspects such as production time, environmental impact of the operations, chemotherapeutics, water and energy use.

In his work as a veterinarian in farms and solving health issues, functional nutrition came as a powerful tool in modern fish farming.

"Fish performance is not only about FCR, growth etc, it is about production time, feed types and feed costs. If survival rates are good with antibiotics, this is not acceptable too. Flesh quality has to be what the consumers want and flesh quality downgrades are not acceptable.

Healthy fish will always perform better. There are limits with today's farming systems which are getting to be more complex. We are increasing density, productivity and are challenged by various diseases."

This is where functional nutrition has the leverage. Functional feeds enhance fish resistance to abiotic and biotic factors. They

Han Han, Sustainable Fisheries Partnership Foundation (SFPF), China and Henrik Aarestrup, Biomar, Denmark

meet the specific demands of fish during life stages, environmental challenges and disease outbreaks in modern fish farming. Beyond their nutritive value, they can enhance the fish physiological conditions to help them combat pathogens and become less sensible to stressful events (grading, vaccination, change of water quality etc)."

Sourd introduced functional hydrolysate as a new generation of raw materials to formulate high-performing feeds, guaranteeing a high feed intake and feed efficiency, and boosting fish health. The high biological and nutritive value of dietary hydrolysates, either from tilapia or shrimp, was discussed. The active components are peptides and free amino acids, highly bioactive, bioavailable and palatable. Functional hydrolysates help substitute dietary fish meal at high level while keeping high fish and feed performances. As an example, juvenile European seabass fed low fish meal diet (5%) and hydrolysate (5%) showed growth performances as high as with a high fish meal diet (20%), associated to a better gut structure and function. In another example, Sourd showed tilapia hydrolysates have antimicrobial peptides that have the ability to boost the fish immunity.

Moving forward

During the breakout session, groups of participants analysed key challenges and strategies in the two areas, breeding and hatchery management and feeds and feeding. Some of these major challenges and strategies are listed below.

The leading farmed fish in Asian aquaculture are the tilapia, Asian seabass, various groupers, pangasius catfish and milkfish. Apart from the tilapia where commercial operations depend largely on stocks from selective breeding programs, fry production for many of the major species such as the pangasius catfish, Asian seabass and groupers and even for the various carps in China still depend on wild sources of brood stock. For industrialisation and sustainable development of fish aquaculture in Asia, work on selective breeding is required for the other species. As such programs are long term and require large financial and expert resources, support should come from governments so as to benefit industry as a whole. An example is Norway where salmon farming is 100% from stock developed through a selection program funded with public funds. At the same time, they acknowledge that spreading already limited resources over a range of species is not possible and this industry group suggested a focus on the tilapia, Asian seabass and selected grouper species.

There is an overall concern on the level of technology in the breeding and hatchery management sector of the industry. As it moves forward into industrialisation and economies of scale, more intensive systems rather than increasing in number of hatcheries will be the norm. Industry expressed a shortage of not only skills but also knowledge in the industry. These two challenges should be addressed by governments, vocational colleges and institutes of higher learning.

In feeds and feeding, the key challenges are in areas that most of in industry have in common. With raw materials, there is a general agreement that characterisation of the raw materials is a key challenge, for example, not all fish meals and soybean meals are the same. Communication is key and unless this on the same thing, it will be difficult to make progress towards a common understanding. More can be done to make most raw materials more useful and more valuable.

There is a massive amount of information out there but the information flow is not well managed. There is actually a lot of corporate and academic information that can benefit the community. There needs to be an increase the exchange of information. Improved information exchange will help in developing new raw materials or even on improving the utility of existing ones, genotype and then make this information available from a centrally managed database.

Dr Thomas Wilson, Thailuxe Feeds, Thailand led a roundtable. Wilson also presented a joint poster with Dr Mathieu Castex, Lallemand

Processing of raw materials that will lead to more advanced products and new crop varieties will be the new step or game changer for the industry. There is a need to increase our knowledge and on a broader range of parameters of raw materials, such as their economic, environmental and social values such as those determined using LCA analysis. Such communications are important. Under a participation in the SEAT program, feed producers in Asia can address concerns on the environmental impact to seafood buyers in Europe and that seafood from Asia is not as it is being portrayed.

The group conveyed the need for better communication among all the stakeholders; feed companies, academia, raw material and additive suppliers and governments as each have a role to play. It is still perceived that there is a real communication gap between farmers and formulators. The high cost of feeds and relevance of FCRs is a contentious subject that still needs considerable explanation to the farmers.

Regionally, regulations on feed specifications vary without any apparent scientific basis. There needs to be standardised minimum specification criteria to a common standard that allows trade across borders within the region. In targeted education, the team recommended that academia needs to link up better with industry and move towards what they (industry) needs rather than pursue academic publication outcomes. Governments need to be aware of what is happening in industry and academia needs to improve the relevance of the training they provide and assist in giving out relevant information to support the sector.

Functional feeds clearly have a role in the industry in Asia but again there is need to communicate to the users on the benefits, be

it reducing stress or environmental emissions. The recommendation to assist the progression of functional feeds in the region is to develop a common standardized method of assessment using a common experimental format. Communication is essential to help the farmers to understand the value of the functional feeds.

On technical aspects, there is still a need to optimize performance of tilapia, seabass, cobia and better understand what the animal needs at each of its life stages. With progress in the selective breeding of a range of species, there is a need to work closer with multidisciplinary teams to realize the link between genetics and nutrition more effectively.

There is so much research being done throughout the region and the world, but there is an absence of a unified direction on those major issues facing the sector. Business factors may not allow access to all information, but there are still considerable resources that can be accessed and made publicly available. Public funds should be better used to address issues, which affect all stakeholders, and this should provide an opportunity to pool resources and foci. Having a focus on the top 12 important species would allow the development of a database on both nutritional requirements and also raw material evaluation. Introduction of a levy system on feed sales to generate a research funds pool could be used to help support that work which addresses some of those identified larger issues.

In 2014, TARS will focus on the shrimp aquaculture industry. It will be held from 20-21 August and the venue will be announced soon. In the next issue, we will discuss the presentations and breakout groups output on production, health and management as well as on marketing and sustainability.

Roundtable with participants from PT Mabar Feedmill, Cargill, PT Feedmill, PT Matahari Sakti and PT Suri Tani Pemuka, Indonesia

At a roundtable on Breeding and Hatchery Management, left, Morten Rye, Alessandro Moretti and Jim Collins, Gold Coin, Thailand

Indonesian translations of best practice manuals for the grouper

Nursery management of grouper: a best-practice manual (Indonesian translation)

Publication Code: MN150a ISBN: 978 1 921962 96 7 (print), 978 1 921962 97 4 (online)
Release date: January 1 2013
Author(s): Suko Ismi, Tatam Sutarmat, N.A. Giri, Michael A. Rimmer, Richard M.J. Knuckey, Anjanette C. Berding and Ketut Sugama

Hatchery management of tiger grouper (*Epinephelus fuscoguttatus*): a best-practice manual (Indonesian translation)

Publication Code: MN149a
ISBN: 978 1 921962 94 3 (print), 978 1 921962 95 0 (online)
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Author(s): Ketut Sugama, Michael A. Rimmer, Suko Ismi, Isti Koesharyani, Ketut Suwirya, N.A. Giri and Veronica R. Alava

Korea-China-Japan joint symposium on aquaculture

Liping Liu (second left), Shuolin Huang (third left) and Sungchul Bai (middle) with speakers and guests

In April, a small group of academicians and industry participated in a joint symposium to share ideas and technology to advance research in aquaculture in Korea, China and Japan. In his introduction to the symposium, Dr Sungchul Bai, president of the Korean Society of Fisheries and Aquatic Sciences (KOSFAS), said that the society with the joint organisers, China Society of Fisheries (CSF) and Japanese Society of Fisheries Science (JSFS) wished to see a better exchange of the latest information and encourage networking among participants. The symposium was held prior to the triennial forum of the Asian Fisheries Society (10AFAF) and the 4th symposium of cage aquaculture in Asia (CAA4) held in Yeosu, Korea. The 3-day 10AFAF had 680 scientists and industry from Asia presenting their work in 11 concurrent sessions.

Professor Shuolin Huang, College of Marine Science, Shanghai Ocean University said that China's rising demand for fish products both at home and for exports have driven growth and profits in aquaculture. Investments and innovations have boosted its aquaculture development to its position as a superpower in aquaculture contributing to 70% of the global output.

"However, it also has to fulfil its obligations as a responsible aquaculture producer and provide safe and nutritious aquatic products. Aquaculture in China today has moved away from expansion of farming area and increasing output. There is now a strong emphasis on production of high quality products that are safe and of high nutritional and economic value through technological innovations, intensification and integration."

Changing aquaculture

China is now a net importer of fisheries products if fish meal is not included, said Dr Liping Liu, College of Fisheries and Life Sciences, Shanghai Ocean University. His analysis showed that although there is rising prosperity and demand for seafood has increased, unfortunately, production costs and land costs have increased even faster. There are several reasons for the lower growth rate of production, among them genetic degeneration, disease outbreaks, climate change, natural disasters and more importantly, competition for land and water use. A new philosophy is to provide better seafood - from farming with green water to utilising ecological models and from culture systems with adverse environmental impact to the adoption of ecological remediation to reduce pollution. The move is towards the production of high value shrimp, mandarin fish, Chinese mitten crab and Japanese sea cucumber.

Among the three countries, Japan is the only one with a decline in aquaculture output during the last 10 years. In 2010, it produced 1.1 million tonnes of fish which corresponded to 20% of total national fish production. Tuna production from farming has increased from 500 tonnes in 1999 to 10,000 tonnes in 2012. Fish farming is becoming difficult in Japan due to rising costs of labour, fuel and fish meal as well as continuous occurrences of red tides and fish diseases. The paradox is that increasing productivity will reduce fish prices. "In addition, the younger generation is losing preference for fish and there is competition from imports," said Dr Atsushi Hagiwara, Nagasaki University. "Aqua farmers are good at production but have no control over commodity prices. Aquaculture was affected by the tsunami in 2011. But the upside of this is that consumers seek better quality seafood from safe and secure production which aquaculture can offer, including a traceable system with correct and useful information on products.

"The public sector has to develop programs for innovative technologies to improve productivity and reduce costs. Collaborative research with engineers and molecular scientists are ongoing. If the past strategy was high value food fish production, the new strategy is multidisciplinary training for problem based learning. Direct sales via online shopping and to supermarkets are new marketing channels."

"In Korea, the seafood consumption is high at 54.7 kg/capita and aquaculture has been expanding but Korea still imports seafood. In fish farming, a way forward is to focus on Olive flounder, grouper, eel and tuna and encourage farmers to use more sustainable practices, including offshore and organic aquaculture," suggested Bai.

The future

Although aquaculture is important economically for the three countries, the majority of species cultured are wild strains which have not been genetically improved for commercially important traits such as growth rate, disease resistance and maturation age. The future is integrating genetics technologies into aquaculture and the long term goal of the work of Dr Takashi Sakamoto, Tokyo University of Marine Science, is to use genetic markers to increase efficiency of artificial selection in stock development and improvement. Marker assisted selection (MAS) of lymphocystis disease resistance in Japanese flounder *Paralichthys olivaceus* has been successful and one million fry are produced annually. This contributes to 30% of the Japanese market. Similarly, there are now MAS for parasitic disease resistance in yellowtail *Seriola quinqueradiata*, and that of bacterial coldwater disease resistant ayu fish *Plecoglossus altivelis*. Similarly, Professor Woo Seok Gwak, Gyeongsang National University said that biotechnology will also allow scientists to identify and combine traits in fish and increase productivity. However, it should be used together with conventional technologies to help solve problems and be need driven.

Responsible shrimp farming in Vietnam and globally

Among the several initiatives for responsibly farmed shrimp production is with one targeting 115,000 tonnes by 2015, mostly from the region.

There is a growing demand for responsibly produced shrimp but at the farm level, the incentive to improve farming practices is often when the demand comes from major retailer or markets. In turn, these require advice and investments. Usually, the desire by small scale shrimp farmers to improve farming practices is side-tracked by the harsh competition although there are serious production and food safety risks when best practices are not followed and that the impact of shrimp farming on the environment is a constant criticism. An overview and dialogue on the several on-going private-partnership initiatives was the focus of a conference on 'Improving the sustainability of shrimp aquaculture in Vietnam through a public-private partnership' held during Vietfish 2013.

"Improving the sustainability of the aquaculture sector is key for a country like Vietnam where there is a lot at stake as the export of seafood such as shrimp is a major contributor to national economy. Many efforts have been devoted to it by industry itself and governments, although producing shrimp sustainably remains a major challenge, particularly for small scale producers. Producers also acknowledge that responsible shrimp production improve their competitiveness and reputation. It is an issue to be addressed jointly by the sector. It is a pre-competitive issue" said Dr Flavio Corsin, senior manager –Producer Support Aquaculture & Spices & Vietnam Manager, IDH (Sustainable Trade Initiative).

Shrimp in transition

The approach of the IDH's Farmers in Transition (FIT) Fund for farmed shrimp is to leverage on the demand by retailers and food service companies and by the inherent incentives of producers to improve farming practices. It co-funds farmers' and farming companies' efforts to implement more sustainable practices. It has a target of 115,000 tonnes of responsibly produced shrimp by 2015, involving at least 10,000 farmers and employees and benefiting at least 10,000 ha of natural ecosystems. Of this, 50,000 tonnes is expected to be sold as responsibly produced to buyers committed to the project. The program also envisions improving in the sustainability of feed ingredients by promoting the production of at least 20,000 tonnes of aquaculture feed compliant with responsible aquaculture requirements such as ASC Shrimp Standard, GlobalG.A.P. Compound Feed standard or the BAP Feed Mill Standard.

It is what IDH envision for shrimp aquaculture. IDH's goal is to have 15% of EU shrimp imports responsibly produced by 2015. In pangasius, IDH supported the sector's effort in close collaboration with the Vietnamese government, VASEP, VINAFIS and WWF to promote ASC certification by 10% of the sector. It has similar programs in cocoa, tea, cotton, soy, coffee, cashew, electronics, timber and others. IDH accelerates and up-scales sustainable trade by assembling coalitions of front running companies, civil society organisations and governments to transform international commodity. Funding for these programs is from the Dutch, Swiss and Danish governments, and foundations such as the Packard Foundation. Private partners match these funds.

"The principle behind this FIT fund is to support shrimp farmers to implement more sustainable practices but the push factor is that buyers must work with the suppliers to meet their requirements. The fund's objective is to accelerate the sector's progress towards farming methods that deliver responsible and traceable shrimp," said Corsin.

Acting together

The goal of the fund is to co-invest in field level projects where shrimp farmers implement more responsible practices to meet buying requirements on sustainability. The aim is also to show measurable and meaningful positive social and environmental improvements in performance and help seafood buyers to increase the availability of more responsibly produced farmed seafood. It will also address relevant bottlenecks in sustainability such as training and organising producers, strengthening the capacity of producer organisations, traceability and access to finance. Lastly, it will engage government and other stakeholders in the countries of production to improve the environment for responsible production.

"How does it do this? IDH brings the private sector to co-invest with them. To access the fund, there should be ideally at least two links from the value chain, one partner such as processor and buyer and farmer interested in reaching these goals. It is of course best to have the whole value chain committed to the shift as to recognise that shifting towards responsible production should not be entirely on the shoulders of farmers," said Corsin.

IDH does not do the implementation itself but contracts this to local partners in the country. In Vietnam, it is ICAFIS (International Collaborating Centre for Aquaculture and Fisheries Sustainability); the sustainability centre under the Vietnam Fisheries Society (VINAFIS). "How does this work in Vietnam? ICAFIS will work with project applicants to obtain project proposals which are submitted to IDH. These go to an assessment committee which advises on whether to support or not and this advice is considered by a FIT Fund Steering Committee. The FIT fund has been designed first for the shrimp sector, but it may also be applicable to tilapia and possibly other aquaculture species also in the future. The focus countries are Vietnam, Indonesia, Ecuador and Thailand but projects outside these countries such as Bangladesh and India can be considered too."

"The FIT fund only works when there is market demand for change. This is particularly important for schemes that are recognised mainly within countries of production, e.g. Viet GAP. In that case the fund will support only upgrading of farms upon the request of an independent processor or buyer," said Corsin.

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Dr Flavio Corsin (left) and Charles Antoine Bui, Binca Group

"The FIT fund works on co-financing. It supports with 35% of funding and 65% of funding from beneficiary parties in the case of large scale farms. When the farm is small scale, the funding terms are shared equally (50:50). The quantum is EUR30/tonne for large scale farms and EUR90/tonne for small scale farms. The fund supports the shift towards certification schemes such as ASC, Global Gap or Best Aquaculture Practices (BAP). It also supports 'softer' approaches e.g. compliance with BMPs."

Transition in Vietnam

The top five provinces for shrimp production in Vietnam are Kien Giang, Soc Trang, Ca Mau, Bac Lieu and Ben Tre. ICAFIS is working on the preparatory stages for FIT funding for projects in Ca Mau and Soc Trang provinces. At the preparation meeting for first national dialogue on aquaculture sustainability in Can Tho City, ICAFIS talked to stakeholders on the sharing of experiences and discussed benefits of co-funding and image building which all stakeholders should be part of for responsible production.

Mai Thanh Chung, Aquaculture program officer, ICAFIS outlined a total of 7 potential projects in Ca Mau, Soc Trang, Bac Lieu, Tra Vinh, Vung Tau, Quang Nam and Phu Yen which involves production of 20,000 tonnes/year. It will benefit 7,976 farmers. The production area is 6,600 ha and species-wise will cover both monodon and vannamei shrimp.

"Certification wise, we can look at ASC (Aquaculture Stewardship Council), Global GAP, Viet GAP, BMP (Best Management Practices) as well as organic. The total projects cost will be more than USD 3.5 million."

Corsin said, "The FIT Fund does not finance changes to infrastructure. This is only possible within the private sector contribution to the project. In other transition programs, we have been working with banks for infrastructure financing which could also be suggested for aquaculture projects."

Traceable shrimp from small scale farms

The production of traceable shrimp is a challenge when dealing with small scale farmers. The current arrangement is that brokers and middlemen buy shrimp from many farms and supply processing plants. They play an important role but do not guarantee the quality of the shrimp required by buyers. The concern is adulteration with chemicals and water to increase weight, which is not uncommon. This affects the image of shrimp from Vietnam.

The standards drafting of the shrimp standards under the Shrimp Aquaculture Dialogues (ShAD) is expected to be completed for implementation by ASC in late 2013. While it waits the auditing for certification to begin, World Wildlife Fund (WWF) Vietnam is supporting some field testing of the ShAD latest version in Vietnam. In a project aimed at promoting compliance to the ShAD standards, WWF is using ShAD version 2 as a guide for small scale farmers in Ca Mau, Soc Trang and Bac Lieu. The funding is from DANIDA, Denmark.

"The focus is on three criteria; capabilities, access to markets and guide on how to comply. We then choose 4 cooperatives to work for ASC certification, link them with markets for these products from BMP. WWF also acts as referees between farmers and buyers and help them with the buying contracts," said Huynh Quoc Tinh, WWF Aquaculture field coordinator.

"We began this in 2012 using ShAD draft standards. We have 30 shrimp farmers groups comprising 575 members from Soc Trang and Ca Mau. We have established a supply chain for 11 tonnes of traceable shrimp. How can we ensure traceability in small farms? In Soc Trang, production is one crop per year and agents collect the harvest to processing plants. Traceability is ensured at the farm and pond level. If there are more than 2 crops per year, traceability is at a group level. If there are 10 ponds belonging to 3 owners, we will also do group traceability. In this case, it is important that the intermediate partners are wholly committed to this program."

Some of the challenges faced in the implementation of this program include the reverse swing to semi intensive culture, low quality post larvae which means controlled use of chemicals for disease, discharge of waste water back into the environment, poor disease management, immediate purchasing protocols and impact of climate change.

Shrimp and mangroves

One of the primary focus of SNV Aquaculture in Vietnam is the link between mangroves and shrimp culture. This is a key impact pathway for development, according to William Wallace Murray Program Leader-Aquaculture. SNV is an international non-profit focused on sustainable development. The prime objective of the Mangroves and Markets project in Vietnam is to conserve mangroves as part of climate change adaptation and mitigation but also to consciously improve the lives of those who depend on the mangroves.

Currently in Ca Mau province, there is the 3-year project to promote organic shrimp production, preserve mangrove loss due to shrimp intensification and facilitate market linkages between small farmers and processors/traders. It supports 600 farmers and product certification with Naturland and Biosuisse. There is an internal control system with group audits as a mechanism for joint certification. Minh Phu Seafoods, Vietnam's leading shrimp producer and processor has agreed to buy all the shrimp at a premium of 10% at the farm. Although SNV fully supports certification, Murray added that it is not an end all and what is more important are improvements such as best management practices (BMP). This is an example of a private sector link and farmers where SNV and Minh Phu works closely together providing supportive training and monitoring to give farmers access to new markets.

From left, Pham Nam Duong, former deputy director of Department of Agriculture and Rural Development of Tra Vinh province with Dr Le Thanh Luu, director, ICAFIS and William Murray, Program Leader-Aquaculture, SNV

Black tiger shrimp products farmed in Ca Mau at the Minh Phu booth during Vietfish 2013. These are size 8/kg exported to Australia and Japan. In line with the biosecurity rules, only cooked shrimp may be exported to Australia

Another project is the responsible shrimp culture improvement II which is also in Ca Mau. The 18 months project has looks at gap analysis to answer where are you now and where do you want to go? SNV supports technical training, group formation and links to markets for production in Ca Mau. Next it will be supporting the implementation partner and technical assistance as national coordinator for the FIT fund in Indonesia. This was launched in Surabaya in June.

Ready for 2015

According to Timothy Moore, the USAID program on 'Maximizing Agricultural Revenue through Knowledge, Enterprise Development, and Trade' or MARKET is not only to support regional food security but also to catalyse sustainable development and the integration of the aquaculture sector by 2015. By December 2015, ASEAN will be a single community. This is an impetus for the private sector to work together.

"The small scale farms in Asia face inequitable access to technical and financial resources. They are most vulnerable to disease outbreaks and productivity is about 10% that of semi intensive culture farms. In trade, the problems and many face difficulties in meeting the food safety, quality assurance and sustainability requirements."

"MARKET was asked by Southeast Asia Fisheries Development Centre (SEAFDEC) and ASEAN for a program on sustainable fisheries and aquaculture and a year later, we decided to focus on priority areas under a task force and this is to improve regional and national farm level aquatic disease and health management which we see as a trans boundary issue."

An ASEAN level public-private informal task force for sustainable fisheries and aquaculture has been established and will be the key platform. "It will be one working on a regional level and look at key and emerging issues. The focus will be in 5 areas; promote sustainable aquaculture feed management practices, develop an ASEAN Good Aquaculture Practices (GAP) standards and Certification Scheme, promote zonal management policies and practices for aquaculture production and improve gender participation and equity within the aquaculture sector."

Strengthening collaboration

"It is essential for responsible shrimp farming initiatives to work together and possibly be co-financed by the FIT Fund as to ensure sharing of learning and increased efficiency. It is a pre-competitive process at all levels and only in this way we will be able to bring a considerable shift in the shrimp farming sector, which is so important for the livelihood and economies of many countries in the region," said Corsin.

A commitment to the environment

By Zuridah Merican and Soraphat Panakorn

Thai shrimp farmers walk the talk with reforestation of the mangroves in their coastal areas.

Shrimp farming in the region with its resulting impact on the environment has had its share of criticisms. NGO groups often alleged that the shrimp farming industry destroys mangrove forests for profits. Admittedly, when commercial farming of the marine shrimp began in the early 1980s, large areas of mangroves were used to construct ponds. Shrimp farming is blamed for the worldwide destruction of 35% of the world's mangroves (Barbier, 2006). Today there are guidelines as well as regulations on the conversion of coastal areas for brackish water shrimp and fish farming. These include leaving a mangrove fringe along the coastline. However, it is evident that among the achievements in reducing the impact of farming on the environment, the current technology utilising almost zero water exchange stands out as a major achievement.

In the case of existing ponds, stakeholders have been active in replanting mangroves to rejuvenate the mangrove forests and its ecosystem. Perhaps the best example is the initiative by the Department of Fisheries Thailand (DOF) which started the reforestation programme in 1981. These are Royal projects launched throughout Thailand, to examine problems and find solutions related to mangrove destruction in the coastal environment and using an integrated approach to develop an effective programme of environmental conservation. The mangrove reforestation project at the Kung Krabaen Royal Development Study in Chanthaburi province along the Gulf of Thailand, involves the replanting of mangrove trees by shrimp farmers and volunteers in areas used for shrimp farming. A biological treatment system for pond effluents improves the quality of the water discharged into the surrounding environment. This is a classic effort by the country to demonstrate the efforts of the government and industry.

Corporate examples of mangrove replanting are seen in the Unima group which collaborated with the World Wildlife Fund in Madagascar in planting 922,000 trees to protect the environment and offset its carbon footprint. In India, in the Bismi Prawn Farms in the Sirkali coast in Tamil Nadu, mangroves are replanted throughout the farm and in effluent treatment ponds to filter excess nutrients prior to discharge to the sea. Shrimp standards under the Best Practices (BAP/GAA), Aquaculture Stewardship Council (ASC) and GlobalGAP has guidelines on adherence to such environmental issues.

Their way of reforestation

In Suratthani Province, a group of shrimp farmers are doing their share to rejuvenate the mangrove forest in the Amphoe Punpin. The mangrove forest is now moving closer to its original boundary with the sea after 8 years of replanting. This has been possible with the support of the government and volunteers from the surrounding villagers. As the years pass by, the walkway to the open sea has been extended and is now 500 m long. Prasert Chanjukorn, Liled district chief is leading the conservation efforts as chairman of the project. He said, "Some 22 years ago, the mangroves comprise 500 rai (one rai equals 1600m^2) and 8 years later it has increased to 5,000 rai. A survey some 4-5 years ago showed that another 2,500 rai of young saplings were growing. See how they are growing towards the sea. The whole area is now 8,000 rai and we want to protect all this forest."

"There is a committee to oversee eco-tourism in the area. In addition, fishermen see the benefits with rejuvenation as they enjoy better harvests. They then join our efforts as volunteers. We also have an enforcement team that will ensure that fishermen do not destroy our efforts by removing mangrove seeds. Only those registered are allowed to fish and only cast nets are allowed. Trawlers are not allowed. This also benefit shrimp farms as trawling disturbs the pond bottoms releasing hydrogen sulphide which adversely affects water quality of the shrimp ponds. Now we have the migratory birds coming to the area."

The mangrove forest now has 20,000 plants and gradually, Khun Prasert expects a million plants in the area.

Reduced water exchange and recycling

Khun Prasert conducts his shrimp farming business in two zones with a total of 32 ponds. The reservoir ponds occupy 50% of the land area. In one zone, it shares the same district as the mangrove rehabilitation project, but is relatively far at 2 km from the coast. There are seven ponds, each of 3.2-5 rai (0.5-0.7 ha). His culture technology is the reduced water exchange system which is practised by almost 80% of farms in Thailand. This method includes recycling water initially pre-treated with K_2MnO_4, regular siphoning of pond wastes at one corner of the culture pond into a settling pond, constructing overhead bird

Prasert Chanjukorn (left) and Somchai Rakdet

Khun Prasert showing how much closer the mangrove is growing out to the sea

The walkway has been extended to 500m

Spindle aerators at the farm which is complete with crab fencing and overhead bird scaring lines

Sludge is removed to a settling pond next to the culture ponds

Water pump

deterrent lines and crab fencing, deploying 36 hp of spindle aerators/ha and operating an all-in all-out process. Harvesting is one time and shrimp sizes ranged from 60-75 shrimp/kg in less than 80-90 days of culture (DOC) in these ponds which are usually stocked with postlarvae (PL12) at stocking density of 100,000 per rai (62.5 PL/m^2). There are 3 cycles for this zone with new ponds which he began operations in 2012. In an older zone, only 2 crops/year are farmed.

Khun Prasert follows a set pattern with aeration and recycling of water. He checks dissolved oxygen levels once a week. According to him, the lowest DO levels are between 3-5 am. Used pond water is drained into another pond, treated with K_2MnO_4 and then is recycled for the next crop. The sludge in the settling pond is dried by allowing water to evaporate.

The source of 80% of post larvae used is part of the bundling of shrimp and feed. So far, this works well for him as production has been good. The only downfall was an attack of early mortality disease in one out of the 20 ponds during a crop cycle in 2012 and he had to abandon the affected pond. Feed conversion ratio ranged from a high of 1.4 to the lowest at 1.1. Autofeeders are used in some ponds.

Survival rates have been good with an average of 80%. Costs of production range from THB 80/kg for shrimp at DOC 70, THB 90/kg at DOC 80 and THB100/kg at DOC 90. Some cost increases are associated with electricity which rose by 10% in a year. Feed prices have increased by THB 40/kg with two increases since 2012.

Doing it his way

There are 32 workers at his farm with one manager for each zone and with 1 worker or a husband and wife team per pond. Even though the use of autofeeders actually reduced the need for this number of workers, Khun Prasert says that it is not his policy to downsize staff and he merely reassigns the staff to another activity. Most of the staff live with their families within the farm area.

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The co-author, **Soraphat Panakorn** (left) and **Prasert Chanjukorn.** **Soraphat** is Technical Sales and Support manager Aquaculture, Asia region Novozymes Biological, Thailand.
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Launch of the Global Salmon Initiative

A group representing 70% of the global farmed salmon industry announces commitment to sustainability leadership initiative as a path towards significant change.

GSI Press Conference

Jose Ramon Gutierrez

In Trondheim, Norway, CEOs of the global farmed salmon industry today launched on August 15, a major industry-led sustainability initiative. The Global Salmon Initiative (GSI) unites 15 global farmed salmon producers committed to greater industry cooperation and transparency, in order to achieve significant and continuous progress in industry sustainability. The initiative aims to make significant strides in providing a sustainable source of protein (farmed salmon) to feed a growing population.

With a shared ambition of improving industry performance across three pillars of sustainability: reducing environmental impact, increasing social contribution and maintaining economic growth. GSI today announced that they are focusing on areas where they can make ambitious, yet achievable improvements, within a realistic timeframe.

"As an industry, we recognise that while we have made significant progress, there is still a lot to be done in terms of sustainability. As a relatively young industry, we hope that through industry collaboration, research and sharing of knowledge, we can make the necessary changes to do better, and keep getting better," said GSI co-chair Alf-Helge Aarskog, CEO of Marine Harvest.

Keen to make substantial improvements, GSI is concentrating their efforts on three priority areas facing the industry: biosecurity, feed sourcing and meeting industry standards.

José Ramón Gutíerrez, co-chair of GSI and Executive Director of Multiexport Foods SA, commented "Each of our focus areas are critical and integral to the success of our industry, and with commitment across regions to work together for the first time, we have the opportunity for real and beneficial change".

The members of GSI are committed to significant improvements in the sustainability of their operations. The Aquaculture Stewardship Council (ASC) standard for salmon aquaculture provides a framework to guide and report on the progress GSI is making, and the initiative is adopting the ASC framework as its primary reference point for work and progress. It is recognised that while salmon farmers have already been making progress toward greater sustainability, and have met the requirements of other demanding standards, they acknowledge that more needs to be done.

"This is a game-changer. The salmon sector working together and embracing sustainability is going to radically change aquaculture – and affect the food industry in a big way," said Dr Jason Clay, senior vice president of Market Transformation for World Wildlife Fund (WWF).

WWF launched the Salmon Aquaculture Dialogues nine years ago, the outcome of which was the ASC standard. "This commitment shows that these companies see sustainability as a pre-competitive issue, one that they can work on together to make progress more quickly," Clay added.

GSI is committed to working closely with industry partners to ensure it is making significant change in areas affecting the whole of the industry, and is not merely satisfying the status quo. Keen on improving sustainability across the aquaculture industry, GSI has also formed an alliance with the Food and Agriculture Organisation (FAO) of the United Nations. Both parties share a goal of supporting the expansion of sustainable aquaculture as a source of high quality food source for a growing global population.

"Through the GSI and FAO partnership, there is the potential to improve access and the exchange of information and expertise to support global improvements in environmental and social performance across the industry," said Árni Mathiesen, assistant director general, FAO Fisheries and Aquaculture. "GSI provides an opportunity to seriously address sustainability challenges as a commodity subsector and this could provide lessons on how a sustainable industry can be created and maintained, and we hope that we can transfer this experience to developing nations, in support of the expansion of their sustainable aquaculture industry, to provide greater sources of nutritious and healthy food".

As the first initiative of its kind, GSI hopes to maximise their cooperation and resources to ignite improvements which would otherwise be unachievable if attempted individually.

GSI is a leadership initiative established by global farmed salmon producers focused on making significant progress on industry sustainability. GSI is committed to fully realising a shared goal of providing a highly sustainable source of healthy food to feed a growing global population, whilst minimising our environmental footprint, and continuing to improve our social contribution.

GSI member companies include Acuinova Chile; Bakkafrost; Blumar; Cermaq; Compañía Pesquera Camanchaca; Empresas AquaChile; Grieg Seafood; Lerøy Seafood Group; Los Fiordos; Marine Harvest; Norway Royal Salmon; SalMar; Multiexport Foods SA; The Scottish Salmon Company; Scottish Sea Farms. These companies have presence in Chile, Canada, Norway, the Faroe Islands and Scotland, and make significant contributions to the economies of these respective countries.

More information: Web: www.globalsalmoninitiative.org Email: GSI@axon-com.com (GSI secretariat, AXON Communications, UK).

Vietfish 2013: Sustainable seafood production

Johan Suryadarma (right), vice president Indonesian Fishery Product Processing and Marketing Association (AP5I) who is also current chairman of the ASEAN Seafood Federation (ASF) with Anindhia Restraningtyas, Bureau Veritas, Asia Zone Certification, China

Each year, the Vietnam Association of Seafood Exporters and Processors (VASEP) organises the annual gathering of seafood industry groups at the Vietnam Fisheries International Exhibition in Ho Chi Minh City (Vietfish). This is a platform for the domestic industry to expand markets, introduce the latest products and network with industry members. The event has become an essential industry activity on their home ground. Vietfish has the strong support of top seafood companies as platinum and gold sponsors. This year the annual meeting of Vietnam's seafood producers, processors and exporters was held from 25-27 June. According to VASEP chairman, Tran Thien Hai, the association also celebrated its 15th anniversary this year.

The global seafood industry acknowledges that 2013 is a tough year as it faces the global economic malaise, trade barriers, and demand and supply issues. In Vietnam, these realities are reflected at this year's show which was a relatively subdued event compared to previous years. Despite high demand, supply of the two major seafood commodities in Vietnam, pangasius catfish and shrimp are being dampened by low selling prices and production woes due to the early mortality disease (EMS). Nevertheless, the show featured 230 booths, taken up by 163 domestic and foreign companies. The number of foreign booths was larger than last year's event and interestingly, increased participation from aquaculture suppliers which reflected the migration of the mainly seafood processing business in Vietnam to an integration model encompassing aspects of the supply chain from hatchery to grow out, feed production, processing and export.

Exports doing well

Seafood is a major foreign exchange earner for the country and in 2012, exports of various seafood totalled USD 6 billion, making it one of the top three exports of Vietnam. The target for 2013 is USD 6.5 billion and up to May 2013, seafood export totalled USD 3 billion according to VASEP. Over the January to May 2013 period, the 20 top pangasius integrators exported USD 433.1 million of pangasius fillet, whilst in the first four months of 2013, shrimp exports totalled USD 619 million which was an increase of 0.8% over the same period in 2012. In the period from January to May 2013, the US and ASEAN region increased its share of imports to 24% and 7.4% respectively. At the same time, EU imports declined by 15%. In the case of shrimp exports, Japan is the leading importer at 27.2%, followed by the US at 21.44%, China and Hong Kong at 13.9% and EU at 12.65%.

Food safety still a concern

Food safety issues continue to challenge industry in Vietnam, in particular with shrimp exports to Japan. There is an on-going blame game as processors and exporters push responsibility to farmers and materials used in farms. In June, thanhniennews.com reported that in the last three years, the EU found 112 shipments from Vietnam with violations of antibiotic residues and other chemicals, while Japan listed 317. Similar to what it did in Vietfish 2012, the ASEAN–Japan Centre and Vietrade organised a discussion entitled 'Seafood Exports to Japan: Market Trends and Import Regulations' to advise industry on regulations, quality checks and what it should do to improve its reputation.

Towards quality seafood

This is the trend that the seafood producers and exporters want to demonstrate to the global markets. In an interview with Seafoodsource.com during the European Seafood Exposition in April, Dr Nguyen Huu Dzung, vice president of VASEP reiterated that after years of increasing production volumes, the focus is now on the quality of its products and eliminating issues such as excessive glazing of fillets. With integration, top pangasius producers, including Vinh Hoan, Hung Vuong, Caseamex, and shrimp producers such as Minh Phu and Quoc Viet and several others all show their devotion to control quality along the production level with good aquaculture practices.

Certification

The road to sustainable production for better access to markets is through certification. Vinh Hoan's two farms were certified by Bureau Veritas in April 2010 for GlobalGAP certification, followed by another three farms in 2011. Other farming areas are applying for GlobalGAP standards so as to reach the target of having the largest production areas complying with these standards in Vietnam. The whole chain of custody comprising feed mill, hatchery and processing plants were

Roy Palmer (right), Ken Copron (middle) with visitor, Allen Ming-Hsun Wu, Nutriad Taiwan at the GAA booth

At the Control Union Certification booth, Le Tran Truong Thuy, auditor (left). The international company carries out inspections, audits and issues certificates

certified with GlobalGAP in 2011. In a seminar on 'A global solution in collaboration with Vietnam producers', speakers Valeska Weyman, GlobalGAP Standard Management Aquaculture, and Le Tran Truong Thuy showcased the benefits of aquaculture standards to 45 participants in both English and Vietnamese. "In the case of standards for the pangasius, there has been broad stakeholder participation during its development since 2006. The trials actually involved two cage farms, four pond systems and two hatcheries. Now, with half a million tonnes of GlobalGAP certified farmed fish, Vietnam proudly represents one of the top fish producing countries adhering to the preferred farm assurance system in the market", said Weyman.

The standards for compound feed started with feed companies carrying out their own assessments but retailers asked for third party certification. GlobalGAP supported the feed industry on how to move forward with sustainable use of resources. "Now with 24 GlobalGAP certified compound feed mills in Vietnam, aquaculture producers can cover their entire production chain and comply with the certification system requirements," added Weyman. The certification body also held a workshop entitled "Aquaculture Certification in Asia: Status, Challenges, Opportunities and Way Forward" at the ASEM Aquaculture Platform on 26 June.

The Best Aquaculture Practices (BAP) of the Global Aquaculture Alliance (GAA) held a seminar led by BAP director of quality control Jeff Peterson and assisted by vice president Lisa Goché and Nguyen Thi Thanh Binh who provided the Vietnamese translation. Attended by more than 60 people, the 45-minute seminar focused on recent BAP developments, including the BAP multi-species farm standards. The seminar also presented the 'value proposition' argument for third-party certification and the many benefits of the BAP program.

According to GAA, the addition of the new multi-species farm standards represents a significant advancement for the BAP program, as it opens up the program to a number of finfish and crustacean species not previously covered, including seabass, sea bream, cobia, Seriola, trout, grouper, barramundi, perch, carp, flounder, turbot and striped bass. The new multi-species farm standards apply to all types of production systems for finfish and crustaceans, excluding cage-raised salmonids, for which separate BAP standards exist. The new standards also address environmental and social responsibility, food safety, animal welfare and traceability more rigorously than the standards they're replacing. For example, the new standards contain 33 clauses relating to worker safety and employee relations, compared to just 12 clauses in the previous standards (gaalliance.org).

Peterson and Goché drew attention to the behind-the-scenes work of the BAP market development team in creating and sustaining demand for BAP-certified seafood products. Roy Palmer, BAP market development manager in Australasia, who also attended Vietfish, gave first-hand accounts of these efforts. The presentation was followed by a lively two-hour question-and-answer session. In addition, the team also held a three-day auditor training course. The Farm and Shrimp Hatchery Auditor Course took place in Ho Chi Minh City from 19-21 June. The class included new and returning auditors and observers from India, Malaysia, Philippines, Singapore, Thailand, Taiwan, the United States and Vietnam. Attendees originated from all sectors of the global aquaculture industry, including growers, processors, seafood buyers, importers and exporters, and government officials.

At Vinh Hoan's booth, with chairperson Truong Thi Le Khanh (second right) with Phu Duc Vo, director (left) and Philippe Serene (right).

Water and energy solutions

Nine Swedish technology firms under the Swedish Pavilion introduced water quality and treatment technology for the seafood and aquaculture sector. As Sweden has a long history in water treatment and conserving the environment, Swedish Centec Vietnam and VASEP organised a seminar 'Vietnam - Sweden Dialogue on Sustainable Business' where Swedish companies presented various green technology and environmental solutions for the seafood and aquaculture sector in Vietnam. In his introduction, Dr Dzung said that Vietnam enterprises have shown interest in the aspects of safe water, usage of energy in an efficient manner and the best balance in waste water management.

CENTEC was established in 2011 and is a project under the Swedish Embassy, Hanoi. The aim is to foster partnerships in the area of environment, energy and climate change between Swedish companies and Vietnamese partners. Josab, which designs ecological water treatment products uses the adsorbent and other properties of the natural zeolite clinoptilolite for its water treatment products. In Vietnam, the company is developing a system of water treatment for fish and shrimp farms and is located in Bac Lieu. Blab is a trading house in green technology and innovative sustainable solutions. Blab has signed a reseller agreement for Vietnam with Josab. The target is for shrimp farms to use Josab's ecological water purification plants. As EMS is caused by a *Vibrio* bacteria, Blab said that the product can remove 99.9% of *Vibrio* bacteria. The presentation by Blab introduced CoolSaver® F Moisture Filter which operates on a desiccant principle, absorbing moisture from the air before it turns into ice. It then eliminates ice forming on walls, evaporator fans, etc in walk in freezers and also reduces energy usage by 30%.

ZeroBact has proprietary technologies for the production of stable and effective cleaning and disinfection fluids based on natural raw materials such as water and salt. An equipment for the daily disinfection of water in hatcheries and small operations uses only 80 W of electricity and producing 20 L/hr of the fluids. The higher capacity machine is capable of 4,000 L/hr. The company said that daily disinfections of hatchery water allows for less interference in production. It also provides an effective control on viral and bacterial diseases and almost total abolition of the use of antibiotics.

Konseb supplies technologies for sludge handling. Equipment is tailor made for each case in order to meet the needs of specific clients. During the seminar, the company presentation discussed three pieces of equipment: robot 90 which collects any sludge from any kind of basins including fish farms; DAB which dewaters the sludge effectively; and solar driers. Sorubin is a leader in the 'next generation' energy efficient aeration products for water treatment. It has an energy efficient aeration technology called OptusAir, which has great potential in aquafarming in helping to provide higher returns on investment and time.

In 2014, Vietfish will be held from August 6-8 in the Saigon Exhibition and Convention Centre (SECC).

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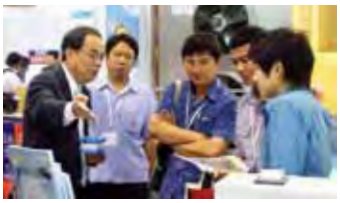

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Expanding marine fish business

One of Indonesia's leading aqua feed companies has a new program to develop marine fish farming in line with its pioneering role in the production of marine fish feeds since 2009.

PT Suri Tani Pemuka (STP) is the aquaculture division of PT Japfa Comfeed Indonesia Tbk, the feed conglomerate. STP was founded in 1989 as an integrated aquaculture operation in Indonesia. It remains strong in the production of fish and shrimp feed, the farming and breeding of the tilapia, shrimp, seabass and other marine fish. The latest farming project is tilapia farming in North Sumatra. In 2012, it expanded production to 195,000 tonnes of aqua feeds from 187,000 tonnes of which 80% was fish feeds. Feeds are sold to independent aquaculture farmers in Indonesia. The feed business unit has operations at 5 locations in Java and Sumatra with total production capacity of 280,000 tonnes.

In marine fish feed production, it is also a dominant niche player since 2004 when it pioneered marine fish feed development in Indonesia together with the Gondol Marine Research Centre and henceforth began to market marine fish feeds, mainly for the Asian seabass and groupers. Two years ago, STP started a Marine Fish Development program and is using a former shrimp hatchery in Bali to produce fry and fingerlings of the pompano, seabass and grouper. It also has cage farms in Bali with 56 cages for the farming of the pompano using fingerlings produced by the STP hatchery and in Banyuwangi, it has 21 ponds for the farming of the Asian seabass.

Marc Wasistha was appointed as head of the program a year ago. At the FITA trade show, Marc explained some recent developments. "Currently, from the hatchery, we sell 200,000 to 250,000 fish per month of pompano, grouper and seabass to farms around Java, Bali and Sumatra. Next we would like to produce 'cantang' grouper fry.

Marc Wasistha at Fita 2013

This is a hybrid of tiger X giant grouper which is popular in Indonesia and the region. We are now waiting for the male brood stock to mature and start spawning."

"Our future plans include international marketing of the fish produced at our farms. The pompano that we farm is currently sold in the local markets at size 300 – 600g per piece. The fish is popular in Indonesia but we are learning that the domestic market will take some time to develop as the fish is retail at IDR 95,000/kg chilled. In comparison, the seabass is around 55,000/kg for live fish. We would like to start marketing the processed or frozen fish. We have processing plant in Banyuwangi complete with a tunnel freezer. If frozen, we will need to add on the costs of processing."

In the case of the seabass, STP faces competition from producers such as Fega Mariculture, Phillips Seafoods, and Indomarine Industries, all with well-established marketing channels to the US and Europe. The common size range is 800g to 1.5kg although some companies produce the larger sizes (2.5kg) for the frozen steak market. Today, Marc is trying to understand what the market wants. He is upbeat on the demand for farmed fish although fish and chicken are the main sources of animal protein in Indonesia. The current demand is good and he expects that volumes of 5-6 tonnes/month will be easy to sell. The outlook does seem bright with rising demand for cultured fish as personal incomes increase but the challenge still remains in selling higher volumes such as 40 tonnes/month.

An Indonesian innovation for cage culture

Yahya Djulaini (middle) with Imam Kadarisman on the right and Supriatna on the left.

The production of Star Gold floating cage systems for marine fish culture in Indonesia has a long history. The company, based in Bandung, Indonesia, was initially founded as Nefo Plastik in 1963 by Yahya Djulaini's father and Yahya now runs the company with his son Bondny. At the Forum on Innovative Technology (FITA 2013), Yahya proudly explained the ideas behind the development of the Star Gold floating cages.

"This started in 2006 when we looked at square cage technology, which industry is very familiar with, and compared it with collar (circular) cage technology. We now recommend the use of circular cage, as it is more hydrodynamic", said Yahya.

"Star Gold circular floating cage product range starts from as small as 3 m in diameter, up to a size specified by customers. For farm sites which are 'a bit further off shore', we suggest cages from 10 m, 20 m and 30 m and more in diameter. These are suitable for seabass or barramundi and for the grow-out of tuna, cages of more than 30 m will be more suitable. In Batam, in waters close to the coast, Star Gold circular floating cages have been used for farming groupers and seabass and pompano in Papua. Circular cages are good for fish movements as there are no corners," said Yahya.

Imam Kadarisman, Star Gold manager explained that these HDPE (high-density polyethylene) cages, at a given normal and proper usage, could last at least 20 years as demonstrated 'in a laboratory simulation'. Anyway, damage would only be at the joints. A 3 m diameter cage will cost IDR 20 million (USD 1925) which translates to a cost of only IDR 1 million/year or less than USD 100/year. In comparison, wooden cages can cost IDR 10 million and last only 2-3 years. Star Gold cages use material produced locally which meet national and international standards such as AS/NZS4130 which is certified by Lloyds register No 071/10054. Star Gold can also customise cages based on the requirements of clients.

There are various models of round cages and one of them is specifically designed for holding brood stock out at sea. Imam said that this is more efficient than holding brood stock in ponds. These cages include a walkway across each cage. The company's cages are already in use for the rearing of grouper brood stock at the research centre in Batam. Smaller cages of 3 m in internal diameter and 3.84 m external diameter are now used for farming groupers in the Riau Islands. (For more information, email: stargold.kja@gmail.com)

Acquisition of shrimp feed company in Thailand

Cargill's animal nutrition business has announced that it is expanding its investment in the shrimp feed industry in Thailand by purchasing Siamakme Aquatic Feeds Co., Ltd, a shrimp feed manufacturer in Thailand.

With this acquisition, Cargill assumes 100% ownership and operation of the Siamakme manufacturing facility which is located in Petchaburi, Thailand. The facility, which was built in 2001 and expanded in 2008, has a production capacity of 60,000 tonnes per year of shrimp feed. Thailand is the world's second-largest shrimp feed market. Siamakme produces feeds for the marine shrimp, both vannamei and black tiger shrimp and freshwater prawn.

"Thailand is a major producer of fish and shrimp with strong growth potential, and we are delighted about this strategic acquisition because it strengthens our presence in Asia and provides a platform for further expansion in this important market," said Watcharapong Poomongkutchai, managing director of Cargill Feed & Nutrition Thailand.

"Siamakme's ambition has always been to manufacture the best shrimp feeds in Thailand," said Jeanny Hung, managing director of Siamakme. "We feel that under Cargill's ownership the business will be able to continue this legacy and tap into Cargill's global expertise to provide Thai shrimp producers with innovative solutions and high-quality products."

The acquisition adds to Cargill's existing shrimp feed production capabilities in Mexico, Nicaragua, Honduras, Guatemala, Peru, Venezuela, India, Malaysia and Vietnam. With this investment, the company will continue to leverage its global research and development capabilities, which includes 15 R&D facilities around the world where researchers develop new and improved feed technologies.

A newco and downstream integration

After several years in the feed production business, local pangasius catfish feed producer Viet Long VDCo has ventured upstream into the farming and processing of the pangasius.

With this integration, director of the newco Long Phu Joint Stock, Vo Thi Kim Hang, now has a fully integrated pangasius business, joining the big boys such as Vinh Hoan and Hung Vuong, albeit at a much smaller scale. Long Phu JS or Lopexco was set up in 2010 and is located in Chau Thanh District, Hau Giang Province where it has the advantage of good connections by road, water and air. It now has 50 ha of farms in Hau Giang with a capacity to produce 25,000 tonnes of fish. The total investment was USD10 million.

"Long Phu is dedicated to the pangasius catfish supply chain; it is integrated with feed production, only for the pangasius, farming, processing and trading. The capacity of the feed plant is 100,000 tonnes per year. Being integrated allows us to practise a close production system. The company's farm which is located within a 10 km range of the processing plant, supplies 100% the requirements for the processing plant. The farm operations are strictly controlled, in terms of growth rate, disease management and treatment. There is also a hatchery in Hau Giang.

"We operate this business with four golden words: friendly, safety, quality and reliability. Our goal is to bring the best products to customers and build long term relationship with our partners. We welcome local and international partners to work with us to reach this goal," said Vo.

"Currently pangasius fish producers are in a situation where the offer prices by retailers are very low. We cannot ask for higher prices as it is a very competitive industry. This has filtered down to the farm level where ex farm prices are as low as VND 19,000/kg whereas our costs are VND 24,000/kg. Feed costs are around VND11, 000/kg and feed conversion ratio is around 1.60.

"As a producer we also look at certification. We already have HACCP and halal certifications at the processing level and now have to study proposals to have Global Gap for the European markets and ACC (Aquaculture Certification Council) for the US markets. These will add to our costs of production but it is necessary to enter these markets and for our long term growth," added Vo.

Currently, the products ranging from fillet (trimmed or skin-on), portions, rolled rose to steak and gutted whole fish are exported through a distributor to China, Thailand, Philippines, Malaysia, Egypt and the Middle East.

"In five years, I would like to develop the company as one which has a strong value brand and which has developed in a sustainable way," said Vo.

This is the first time the company is participating at Vietfish. At their booth, Vo Thi Kim Hang is seated on the left, with husband Tho Tran Ba who is chairman. The next generation is also involved in this family business with daughter Tam Thi Thanh (right) who is responsible for feed formulation. Son Tung Tran Ba Thien (standing, left) is still studying.

One-Star Pompano

The Global Aquaculture Alliance (GAA) announced that Guangdong Gourmet Aquatic Products Co. Ltd's processing plant has been awarded Best Aquaculture Practices (BAP) certification for its processing plant in Wuchuan, Guangdong, China, attained BAP certification on July 8. The facility processes farmed shrimp, tilapia and golden pompano. With this certification, it is the first company approved to offer one-star pompano.

Pompano and a number of other farmed seafood species, including seabass, sea bream, cobia, seriola, barramundi, trout, perch and carp, became eligible for one-star designation when the new BAP standards for finfish and crustacean farms were completed in late April. Products handled at a BAP-certified processing plant is deemed one-star. The plant produces about 20,000 tonnes of farmed shrimp, tilapia, golden pompano and other farmed seafood species annually. The company's products are sold to retail and foodservice customers primarily in Australia, the United States, Canada and Mexico. The company said BAP certification will help give it access to new retail and foodservice markets. The new BAP multi-species farm standards apply to all types of production systems for finfish and crustaceans (excluding cage-raised salmon), replacing the previous BAP farm standards, which were separately tailored for shrimp, tilapia, pangasius and catfish. More information: www.gaalliance.org/bap.

Production stability with new feed

Seabass fry producer also achieves production of consistently high-quality juveniles

In Ploemeur, Aquastream produces European seabass *Dicentrarchus labrax* fingerlings for many of Europe's leading fish farms in its underground hatchery. The company, which was founded in 2000, took the bold step to apply the new micro pellet feeding protocol to its entire production in 2009, although the decision to attempt to move away from *Artemia* use was actually taken three years earlier.

Between 2006 and 2008, Aquastream experienced 60-day survival rates that fluctuated between 7% and 40% with traditional rearing protocols. Disappointed and financially weakened by these results, it set about trying to identify the reasons for the larval mortalities, knowing that similar problems were being shared by other European hatcheries.

The team's attentions quickly turned towards the live prey (*Artemia*), said Nathalie Le Rouilly, production manager for Aquastream. This pioneering French hatchery is now feeding GEMMA Micro feed to larvae instead of the traditional feed of enriched *Artemia* metanauplii. This results in juveniles of the same, consistent high-quality. It also increases the production consistency by significantly reducing costs per million fingerlings.

While *Artemia* provides essential nutrients for the development of marine fish larvae, it is a live animal and therefore quite variable – from its nutritional value and where it is harvested, to how it is enriched and handled. The organism can also harbour bacteria and it has been found that feeding live prey to larvae can cause problems such as enteritis, stress, and create an imbalance in the rearing environment, which in turn can significantly reduce survival rates.

"Identifying a problem is one thing; finding a resolution is another. We therefore decided to work in parallel on two objectives: the first, to improve the quality of our live prey; the second, to partially or totally substitute the live prey with microparticles, namely Skretting's Gemma Micro," said Le Rouilly.

First with sea bream

Between 2004 and 2008, Aquastream had experimented with the micro pellet on sea bream *(Sparus aurata)* achieving successful results. Using this previous experience, the hatchery was able to transfer the protocol to seabass.

In 2008, 25% of the company's larval tanks were dedicated to the development of this new protocol. The results were so positive that the following spring, the decision was taken to apply the protocol throughout the operation.

Over the last four years, Aquastream has significantly reduced the variability of the 60-day survival rates and has increased the number of farming cycles (graph 1).

"We have reduced the necessary quantity of *Artemia* by 97%. We only need 5kg of *Artemia* cysts against 150kg seven years ago," says Le Rouilly.

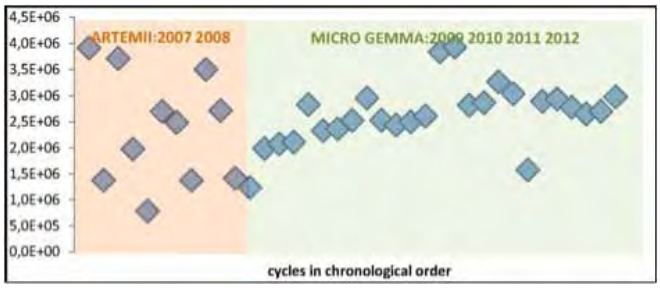
Aquastream also achieved a 90% saving on staff working on live prey - only 0.2 labour units compared with 1.5 in 2007. Additionally, from a financial perspective, the company has reduced the cost of larval food by close to 45% (graph 2).

"For the same costs, we produce at least twice as many fingerlings," said Le Rouilly. She confirms that since the launch of this new protocol in 2009, Aquastream invoices between 15 and 20 million fingerlings per year.

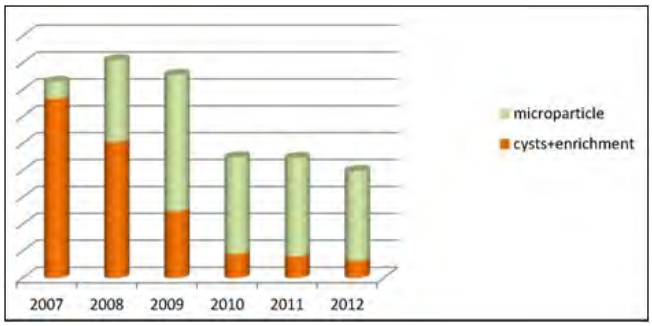
"More importantly, the standardisation of our production guarantees the regularity of supplies to our customers and we can adhere to delivery deadlines planned several months in advance."

Looking ahead, the company's long-term aim is to completely remove the use of *Artemia* and has developed an experimental platform called Labrax Techaqua to achieve this goal.

More information. Email: eamonn.obrien@skretting.com (Eamonn O'Brien, product manager)



Graph 1: Number of larvae per cycle at day 60

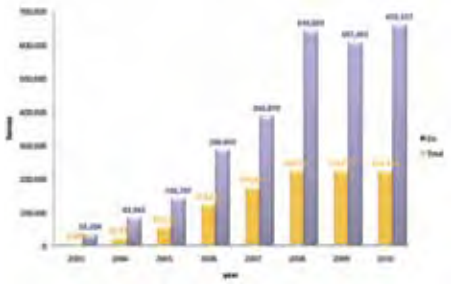


Graph 2: Larval feed cost evolution

Corrections

In the printed copy of issue 4, July/August 2013 in the article, Vietnam's pangasius catfish reaches maturity in 2013 (p40-41), due to a printing error, figures 1 and 2 on page 41 are missing. These are provided here. We apologise for this error.

Figure 1 Pangasius export volumes in tonnes.



Source: Nguyen Huu Dzung, 2012. Vietnam Pangasius Farming Towards Sustainable, presented at ESE 2012, Brussels, Belgium

Aquaculture Industry Engagement Day in Singapore

Key players discuss trends and obstacles to developing the aquaculture industry further, with focus on reducing Singapore's dependence on imported fish.

Republic Polytechnic (RP) and the Tropical Marine Science Institute (TMSI) of the National University of Singapore held the inaugural Aquaculture Industry Engagement Day on August 2. This event was the first of its kind in Singapore, with both academia and industry practitioners coming together to share ideas and knowledge on various trends in aquaculture.

With Singapore's Agri-Food & Veterinary Authority (AVA) aiming to raise the proportion of locally produced fish to 15%, participants discussed trends and plans to reduce Singapore's dependence on imported fish for consumption. The event was attended by 150 people from government agencies, research institutes, institutes of higher learning and the food fish, ornamental fish and tourism industries. Representatives from AVA, A*Star, Oceanus, Qian Hu and Resorts World Sentosa were in attendance, amongst others.

Also present were international keynote speakers including Dr Thierry Chopin, Honorary Consul of France, Chevalier in the Ordre des Palmes Académiques, Professor of Marine Biology at the University of New Brunswick and Noam Mozes, Head of the Mariculture Division, Department of Fishery and Aquaculture, Ministry of Agriculture and Rural Development of Israel. The keynote speeches covered integrated multi-trophic aquaculture and recirculating aquaculture systems which aim to increase environmental sustainability and reduce the need for land and water inputs, and environmental interaction respectively. The two technologies were discussed in the context of land scarce Singapore and to identify ways in which the aquaculture industry could achieve the local contribution in its fish consumption.

Prof Peter Ng, Director of TMSI, noted, "Singapore is both land and resource scarce, and this presents a unique problem for local aquaculture and our researchers. Producing huge quantities of cheap fish, and just of a few kinds, is not enough. We need quality as well as diversity, and we must encourage the local industry to play an active role in producing seafood for Singapore, by making it economically viable."

"Good science underpinned by good business sense will be the hallmarks of a successful and sustainable aquaculture program. Only then can there be real food security," he added.

At the event, Republic Polytechnic also announced that it would be introducing a Diploma in Marine Science and Aquaculture aimed at nurturing a relevant and skilled workforce in marine biology and conservation, aquaculture technology and marine coastal ecology.

"Republic Polytechnic is committed to supporting the growing aquaculture industry, and is playing a role to help fill existing gaps, through providing both a platform for this exchange of ideas at the Aquaculture Engagement day, as well as the introduction of a new Diploma in Marine Science and Aquaculture early next year. The diploma aims to train and prepare students for the industry, as well as to support collaborative projects with our industry partners," said Ashley Chua, deputy director, School of Applied Science, Republic Polytechnic.

Republic Polytechnic is the first educational institution in Singapore to leverage Problem-Based Learning approach for all its diploma programmes, Republic Polytechnic (RP) has six schools and two academic centres offering thirty-seven diplomas in Infocomm, Engineering, Applied Science, Technology for the Arts, Sports, Health & Leisure, Events and Hospitality, Enterprise, and Communication. The polytechnic is committed to nurturing innovation and entrepreneurial learning in an environment that develops problem-solving skills and lifelong learning opportunities. (www.rp.edu.sg)

The Tropical Marine Science Institute (TMSI), a research institute of the National University of Singapore (NUS) serves as a resource centre for tropical marine science R&D and education, to address national and regional environmental research needs. TMSI researchers work closely with government agency managers to address various environmental concerns, from water quality management, biodiversity conservation to climate change planning. The institute also conducts research for industry. In 2002, TMSI's St John's Island Marine Laboratory was opened to support research requiring seawater facilities. The marine station boosts a modern open-circulating seawater aquaria system, supported with research laboratories and living quarters for visiting scientists. Currently it supports 55-60 full time staff and students focusing on marine biodiversity and environmental science research. These include aquaculture-related projects amounting to over SGD2.5 million. (www.tmsi.nus.edu.sg)

More information: republicpoly@webershandwick.com (Matthew De Bakker / Siddharth Singh)

New innovation for hatchery efficiency and cost savings

A cutting edge product of live *Artemia* nauplii free of contamination and cysts is now available from I&V Bio based in Chonburi, Thailand. INST*ART* 1 is live *Artemia* nauplii that will stay alive for 48 hours at +2ºC. The product is ready for immediate use by hatcheries in their feeding regimen and saves hatcheries the cost of preparing their own *Artemia* nauplii.

The founders of the company, Frank Indigne and Luk van Nieuwenhove, each have over 20 years experience in aquaculture. They have established their first concept facility in Chonburi, Thailand. The *Artemia* nauplii produced at this facility are certified Vibrio free.

I&V Bio packs the live *Artemia* nauplii in 800g trays as a dry paste. These trays are then delivered to the hatcheries daily, thus allowing hatcheries to order the precise daily requirement needed to feed their post larvae. I&V Bio's production process has several backup systems which allow the production facility to operate 24/7 to ensure the daily delivery of quality *Artemia* nauplii to its customers.

The company has listed several benefits associated with using INST*ART* 1 which include reduction in hatchery costs, providing a consistent feeding regimen, no worries about *Artemia* hatching results (i.e. it provides the consistency of 800g in each tray) and is contaminant and vibrio free.

I&V Bio's goal is to become a full-range hatchery product supplier. The company is currently building a production facility in Phuket that will triple its capacity in order to meet increasing demand. Future innovations being developed by I&V Bio include enriched INST*ART* 1 nauplii. Enrichment of *Artemia* is essential for marine fish and becoming more popular with shrimp producers to provide a balanced fatty acid profile in early stage post larvae.

The company is currently negotiating with potential investors in India and Vietnam to establish production facilities. It is also seeking partners in other countries to expand the benefits of this unique technology. More information: Email: frank@iandv-bio.com (Frank Indigne)

Biennial Asia Nutrition Forum across six cities

BIOMIN, a leading company in the global animal health and nutrition industry has announced that the company's biennial event, Asia Nutrition Forum will cater specifically to the Asian audience, spanning six cities across Asia from 14 to 24 October. The six cities are Qingdao, Guangzhou, Ho Chi Minh City, Seoul, Tokyo and Hyderabad.

Since 2005, the company has been hosting its biennial Asia Nutrition Forum (ANF). The theme of the 2013 edition is "NutriEconomics® - Balancing Global Nutrition & Productivity", with a focus on people, performance, profit and planet. "Survival alone is not enough. We need to progress in order to feed an ever growing world population," says Erich Erber, founder of Biomin and director of Executive Board.

He adds, "Despite increasing crop yields and more advanced food production techniques, hunger and starvation are problems that still exist today. Where food needs are adequate, the right balance of nutrients is most important, especially for a young child."

At the ANF, key industry professionals from the poultry, pig, dairy and aquaculture sectors will gather to discuss issues faced by the food and agri-industry today. The forum will see a high-level panel of renown industry experts, including Mary Barton, Emeritus Professor at the University of South Australia; John Baize, president of John C. Baize and Associates; Robert Van Barneveld, professor at the University of New England and consultant research scientist (Nutrition) of Barneveld Nutrition Pty Ltd; and Leonardo Linares, technical service nutritionist of Aviagen. Representing Biomin at the ANF are Jan Vanbrabant, CEO of BIOMIN Asia; Guan Shu, technical manager of Biomin Asia, and Franz Waxenecker, director Development Department of Biomin Holding GmbH.

Addressing the issue of the environment, NutriEconomics® will continue to influence the role of animal nutrition in achieving sustainable yet profitable farming. Besides growing competition for agricultural commodities from the food, feed and biofuel sectors (feed security), producers are also faced with obligations to cap carbon emissions – a move that will have significant bearing on production costs. By tackling the twin objectives of quality nutrition and economic viability, and concurrently addressing environmental concerns, the ANF's focus will be on solutions that pave the way ahead for the future of sustainable animal nutrition. More information: pr@biomin.net.

GLIMPSE the Future in 2020

More than 2,300 people from 72 countries attended Alltech's 29th International Symposium in Kentucky, USA to get a GLIMPSE of the world of the future. Among them, 123 were from Asia Pacific. GLIMPSE™ is the acronym coined by Aidan Connolly and Kate Phillips-Connolly in an article published in the International Food and Agribusiness Management Association Review (IFAMA). It summarises the seven key obstacles and the associated opportunities (G = Government, L = Losses in the food and ingredient supply chain, I = Infrastructure (trains, trucks, ports, cold storage, supermarkets etc.), M = Markets, P = Politics & Policies, S = Science & Innovation, E = Environment.)

Dr Pearse Lyons, Alltech founder and president opened the symposium explaining the theme 'GLIMPSE 2020' which challenge delegates to stake their claim in shaping the future, to search out opportunities and to make an impact for a better tomorrow for farmers and consumers. The opening and closing plenary sessions addressed the key issues of how to sustain a business, take stock of new scientific innovations and ensure food safety.

Among the speakers, Rebecca Timmons, global director of research and quality for Alltech, highlighted the latest applications for algae in livestock and human nutrition. Her vision is for algae to provide a more sustainable future for food, feed and fuel. Dr Patrick Wall, University College Dublin, stressed the importance of food safety. "Your brand is as secure as the standards of your weakest supplier", said Wall.

Dr Mark Lyons, vice president of corporate affairs at Alltech also addressed the importance of food safety as he shared the company's vision to expand agriculture production in China. Delegates also had the choice of 22 sessions, covering topics as diverse as farming the sea, antibiotic free production, mergers and acquisitions, entrepreneurship and mycotoxins.

In farming the sea session, Dr Charlie Shultz, Kentucky State University, heralded in the future of aquaculture – Aquaponics. This is a system that integrates hydroponic plant production with recirculating fish culture systems. Aquaponics offers huge potential for profits through shared operations and infrastructure costs and the recycling of fish waste and water. Shultz was one of 11 experts in the aquaculture session. Their talks can be categorised into sustainability, nutrition and management.

Sustainability

Dr John Sweetman, Alltech Greece, asked the question - How can we provide the 90 million tonnes of aquaculture food required annually by 2030? Dr Clive Talbot, Aquaculture Research Services, UK, addressed sustainability as he spoke on optimising fish growth and feed conversion rates. The use of processed animal proteins (PAPs) in sustainable aquaculture was also addressed by Dr Stephen Woodgate, FABRA, UK.

Lyons spoke of the global shortage of fish meal/fish oil and a significant reduction of DHA levels in the produced fillet. Algae are deemed to be the new sustainable source of DHA. Alltech has invested in this area and can supply algae globally. Dr Keith Filer, Alltech USA, spoke on the use of All-G-Rich®. Produced using *Schizochytrium* sp., with at least 50% fat, 14% DHA, 14% protein, it is applied to improve performance, a 0.8% inclusion of All-G-Rich in tilapia diets was shown to increase the fillet DHA level by 70%.

Dr Tasanee Limsuwan, Dr Chalor Limsuwan and Pratan Jongpun, president Charoen Pokphand Malaysia at Alltech Symposium's Kentucky Night held at the Kentucky Horse Park, Alltech Arena.

Nutrition and management

Dr. Philippe Sourd, Aquativ-SPF Diana, France, explained how to improve fish health and performance with a biosecurity system to reduce mortality. The system comprises vaccination and boosting the immune system nutritionally and improving the gut structure by increasing mucosal excretion in skin, gut and gills with nutrition.

Professor Karin Pitman, University of Bergen, Norway, updated the audience on mucosal mapping to improve quantitative health and welfare. The Aquate™ range by Alltech was highlighted by both speakers as a way to improve immunity, reduce sea lice attachments and promote faster response in mucosal tissue.

Dr Chalor Limsuwan, Kasetsart University, Thailand, addressed the mitigation of diseases in shrimp and provided advice on best practice. "The Early Mortality Syndrome (EMS) is not caused by a virus or parasite," said Limsuwan. "Prevention involves: selection of good postlarvae quality, low nauplii density, good feed quality and effective water management."

Davide Pacitti, University of Aberdeen and Scottish Fish Immunology Research Centre, spoke on selenium nutrition and viral interaction. He shared his research on Alltech's Sel-Plex® which improved fish antiviral defenses. Professor Alfred Halstensen, University of Bergen, Norway, gave us the bigger picture on aquaculture's role in human nutrition. He showed us how aquaculture products can help tackle major obesity problems, cardiovascular disease, cancer and diabetes. He gave an example of the Mediterranean diet which consists of fish, olive oil as well as other food sources which contribute to a decrease of 30% of deaths by cardiovascular disease.

Lyons wrapped up the symposium by asking: "Are you going to fly or are you going to soar? Will you flourish? You need to leave here today and say, 'I may not rule the world, but I can have an impact on feeding the world's growing population."

Alltech also announced that the next symposium in 2014 will be held from May 18-21, 2014. The news was contributed by Dr Fuci Guo, aquaculture manager and Alisa Anantvoranich, marketing manager. More information: www.alltech.com/symposium

Bringing together the feed and grain industries of Asia Pacific

Senior executives from the animal feed, grain processing and rice/ flour milling industries of South and South East Asia will converge on Bangkok in April 2014 for the FIAAP/ VICTAM/GRAPAS Asia 2014. It will be open from 8 to 10 April 2014 at BITEC.

In a press release, Henk van de Bunt, the general manager of Victam International, a former feed mill owner and now the organiser of the event said, "The event has now become truly international. Industry executives, colleagues etc. travel from throughout this enormous and increasingly wealthy region to meet together, find out what is on-show at the three exhibitions, attend some of the many conferences that run alongside the exhibitions and much more."

"The event has grown rapidly, especially over the last six years, so that we now see exhibitors from all over the world, displaying many different machines, technology and ingredients for different applications and industry sectors. There is a lot for the visitors to see!"

VICTAM is the core show and will profile the animal feed processing industry. It is the largest sector within the event, both in terms of the number of exhibitors and also the area it occupies. "You will see anything from a hammer mill to the latest in extruders, the number of machines on show is amazing. Exhibitors include: Adifo, Amandus Kahl, Andritz, Awila, Buhler, Dinnissen, Extru – Tech, Forberg, Jiangsu Muyang, Ottevanger, Stolz, Van Aarsen, Wenger, Zheng Chang and many more," said van de Bunt.

"But our visitors are not just interested in milling technology. A feed miller or an integrator, for instance, will also want to find out and also see the latest developments within the specialist ingredients and additives that are so important to the production of safe and cost-effective feeds."

The show in Bangkok will also have the FIAAP show which profiles these feed ingredients and additives. Exhibitors include: Biomin, DAR PRO Solutions, Dr. Eckel, DSM, Empyreal, Kemin, Lab Inter Co., Novus, Nukamel, Ritan Biotech, Special Nutrients, SPF Diana, and more. As the same feed miller will be interested in another aspect of the event, the ancillary equipment and systems that are also on show. These comprise silos, conveyors systems, elevators, computers, coolers/ dryers, trucks and much more.

As it is not just feed millers who require this ancillary technology, there will be a third exhibition, GRAPAS Asia 2014. This exhibition, with its own conference, profiling rice milling, flour milling, grain processing, noodle, breakfast cereal and savoury snack production will benefit grain processors, rice and flour millers, etc.

"By holding these shows together it adds greater value for visitors and offers them, or you, a greater opportunity to source what you are looking for in a short time. We like to think of the event as being a "one stop" show for the industries they serve, we think and hope that each visitor will be able to find what he or she is looking for, and all under one roof over three days," said van der Bunt

Victam International conducts its own visitor survey and in 2012, it showed that over 70% of all visitors were interested in ingredients and additives. In addition, visitors were not only from Thailand but from all over South and Southeast Asia. More information: www.fiaap.com - www.victam.com – www.grapas.eu

Clinical evaluation of new fish anaesthetic

Yoav Rosen, Dr Allan Hares and Dr Ra'anan Ariav of AquaVet Technologies Ltd in Israel have reported on the use a new fish anaesthetic produced by the Stockton group among clientele in Greece, Turkey and Latin America. This is new fish anaesthetic is SEDANOL ®. To date, this product has been used very successfully in seabass, sea bream, tilapia, mullet, African catfish, rainbow trout and numerous species of ornamental fish.

The use of fish anesthetics is developing among AquaVet's clientele during the last few years for various needs such as fish transport, vaccination, fish tagging, fish measurement and spawning. Fish anaesthetics are commonly used to immobilise fish so they can be handled more easily during harvesting, sampling and spawning procedures.

The vast majority of anesthetic procedures is accomplished by a dip or bath treatment in a static bath or with flowing water. In either case the anesthetic must be soluble in water. In some cases, anesthetics are first dissolved in an organic solvent and then diluted in water. The fish is exposed to the aqueous solution of the compound at a predetermined concentration for a specific period of time. Concentrations are typically calculated in terms of parts per million (ppm) or mg/L or g/m^3 of water.

The fish are maintained in the container of anesthetic and removed when they reach the desired level of anesthesia. Once the manipulations of the sedated fish are completed, they are typically placed in a recovery container of fresh water with aeration. This procedure is applicable when the desired procedures can be completed on sedated fish in a relatively short period of time. (eg. less than 1 minute).

Sedanol, based on a natural plant extract has been found to induce anesthesia very rapidly with minimum hyperactivity or stress and is characterised by a wide margin of safety and rapid recovery following removal from the anesthetic stage. It is also characterised by rapid metabolism which makes it the only fish anesthetic with 'zero withdrawal". As such, it can be used very effectively during the harvesting process. More information: info@aqua-vet.co.il

FITA 2013: Innovations as accelerator for the *Blue Economy*

In early June, some 400 aquaculture technologist and industry groups gathered in Lombok, Indonesia for the Forum in Innovation Technology in Aquaculture or FITA 2013. This is the fifth forum organised by the Research and Development of Aquaculture Centre, Ministry of Marine Affairs and Fisheries. The theme was 'Technology Innovations for the Blue Economy' and the aim, to accelerate aquaculture development in Indonesia. Shrimp Club Indonesia (SCI), a partner for this event, also held their annual business meeting.

In the conference part of the event, there were 266 presentations and 174 poster presentations; mainly outputs of research from the various government research and development centres, universities and private aquaculture groups. The special session was on innovations in aquaculture which again focussed on the four target commodities for development; marine shrimp, pangasius, milkfish and seaweeds. Kusno Susanto from Research and Development of Aquaculture Centre, attributed the 115% achievement in increasing aquaculture production in 2012 to innovations both in the public and private sectors.

Researchers from government research and extension centres, from left, Ahmad Mustafa (Maros), Edwin L.A. Ngangi, Joppy D. Mudeng1 Robert J. Rompas, all from Manado and Ratna and Rizald, Rompas.

Automation in feeding to seedstock

In the freshwater sector, Suratno *et al* from the Freshwater Development Centre in Jambi province, Sumatra, showed the prototype of a fish autofeeder which is activated via a cellular phone. Escalating prices of commercial fish feeds has been raising costs of production and to arrest this, the government has been suggesting that industry use more local raw materials in feeds. A series of studies by the team led by Dr Endhay Kusnendar at the Research and Development Centre in Bogor, showed the possibility of using local raw materials in feeds for tilapia *Oreochromis niloticus* cultured in cages. From an economic perspective, the cost of feed was only 36% as compared to 60% when commercial feeds were used. Their work also extended to tilapia cultured in ponds and tilapia brood stock. Evi Tahapari and Jadmiko Darmawan from the Research Centre in West Java presented their work on the mass production of Pangasius jambal seed stock in line with the government's plan to industrialise its farming for the global white fish markets. Their aim was to develop protocols for a continuous mass production of quality seed stock.

Dr Ketut Sugama (left) and Dr Nyoman Adi Asmara Giri, Department of Aquaculture, Ministry of Marine Affairs And Fisheries

The national demand for the freshwater prawn *Macrobrachium rosenbergii* is 30-50 tonnes/month and Sarifin and the group from the Sukabumi Extension Centre showed how to enhance production by stocking 50 post larvae/m^2 with aeration and control of water quality. The group also discussed the benefits of the national project to encourage farming the freshwater prawn and rice as an agribusiness venture or UGADI. The prawn is stocked at 5/m^2 and fed with 30% protein feeds. At a production of 166kg of prawn in a 1000m^2 area after 90 days and the high prices of the prawn at IDR55,000 per piece this is a way to increase the income of padi farmers by 4-7 times. Another program UGAMEDI combines three crops, freshwater prawn, gourami or *Osphronemus goramy* and padi.

In the marine shrimp sector, the innovation covered that of a super intensive vannamei shrimp system presented by Shrimp Club leader in Makassar, Dr Hasanudin Atjo (see AAP, issue July/August 2013). To study the effectiveness of probiotics, Supito *et al*, constructed six 2000m^2 ponds lined with HDPE plastic at the Jepara Research Centre. He detailed the parameters and characteristics of the biofloc in the ponds. The average daily growth (ADG) was 0.21g for the stocking density of 100 PL/m^2. FCR was 1.38 and harvest size was 52/kg. There is value in nursery culture of post larvae as it provides post larvae which have been nurtured to adapt to the pond environment, shorter grow out in ponds and higher survival rates. Suryati et al worked on nursery of black tiger shrimp in floating hapas (4 x 6 x 1.25m) in ponds, stocked at 1,000 to 1,1000/m^2 and cultured for 30-35 days. The parameters for culture were detailed and finally they reported a survival rate of 71.2 – 75% and juveniles of 0.75g each and 2.05cm in length. Rearing in these hapas facilitates easy harvesting.

During the plenary and shrimp session organised by the SCI, several speakers covered a range of subjects. Dr Farshad Shishehchian, CEO of Blue Aqua International, described the scenario on global shrimp production and current trends. His aim was to show industry in Indonesia where they are today relative to global trends in shrimp farming and to be ready to meet future challenges.

Although Indonesia has not reported any incidence of early mortality syndrome (EMS), industry needs to be aware and prepared. As such, both Dr Chumporn Soowannayan, Centex Shrimp, Mahidol University, Thailand and Dr Kevin Fitzsimmons, University of Arizona

Fauzan Bahri, Inve Aquaculture, Indonesia (right) with farm technicans, Joko Susilo (left) and Agus

Plectropoma laevis on display

USA were there to discuss what is known and what is not known on EMS and how farmers can try to avoid or overcome any threats with culturing shrimp with tilapia and other fish species.

In feeds and feeding, Dr Dhanapong Sangsue, Evonik Singapore, discussed the variation in amino acids in raw materials and suggested that nutritionists should also focus on routine analysis aside from book values when deciding on the best value of raw materials. Dr Fuci Guo, Alltech International said that the feed industry is challenged by low supply, high costs and low margins. On the other hand, farmers have to contend with high cost of production and lower fish prices. The game changer, as suggested by Guo is using enzymes in aqua feeds. In his presentation on truths, lies and myths on whether shrimp nurseries are necessary, Imad Patrick Saoud, Department of Biology, American University of Beirut discussed the various models for nurseries and the benefits. The main advantage of a nursery phase is the close control on growth period and size variation.

Selling local

The domestic market is becoming important for the industry, although it is still very low, said Ricky Suhendar, CP Prima. The company has been doing its own market survey on the marketing of shrimp. He said that the competitor to shrimp is the chicken. The per capita consumption of shrimp is very low at 0.011kg/capita versus 21kg/capita for the chicken. Although shrimp has a higher nutritional value, it is much more expensive relative to income levels and this is the problem facing producers such as CP Prima. The good news is that income levels are going up and there is much more interest in frozen seafood.

Their market intelligence shows that it is children that are asking for frozen seafood and driving purchasing decisions. The occasion for consumption is 63% at breakfast and 50% as snacks. One advantage is that frozen seafood has a shorter shelf life which makes consumers believe that it is free of any preservatives. It is also a convenient food which requires less preparation time. However, as consumers avert frozen seafood because of price, the education must focus on the nutritional benefits such as omega fatty acids composition. In the case of growing children, the benefits of omega 3 on brain development should be emphasised.

CP Prima has new seafood products called CHAMP and FIESTA which answers some consumer demands. It is affordable at IDR 10,000/packet. It brings both fish and shrimp to the dining table. The company has also introduced shrimp nuggets and tempura for the local market. The marketing blitz is through education in office lobbies and on the internet. The shrimp is farmed in their 'kampong vanname' or vannamei village; a program with the government to revive shrimp farming in abandoned farms and start vannamei shrimp farming in regions where there is no development.

The government and industry are also working hand in hand to expand the production of both shrimp and pangasius catfish. CP Prima is now producing 30 tonnes/month of pangasius and markets these as whole frozen fillet under the brand name 'Golden Dori'. "Consumer reception has been good," said Denny Indradjaja, Environmental Economic Specialist at the CP Prima booth. "Production will expand to 70 tonnes/month of 800g fish. There are other companies going big in pangasius production such as PT Mabar and Indomargo. Pangasius hatcheries can be found all over the country. We also market saline tilapia which we produce because we are using the fish to cut the disease cycle in shrimp ponds."

Booth of PT Sumber Lancar with aeration equipment for shrimp ponds

Trade at FITA 2013

Here, industry and government aquaculture centres had displays and products of their recent innovations. Out of the 31 booths, 9 booths were taken up by public research and development centres to display innovations in culture technology and new hybrids and strains of tilapia and marine fish. Some of the live fish displays include the 130-day old juveniles of *Plectropoma laevis* or kerapu raja sunu in Indonesian. This is a result of the domestication of the fish at the centre in Gondol Bali since 2009. Mass production commenced since 2011. Other seed stock on display included fry of *Macrobrachium rosenbergii*, *Tors soro* and Nirwana tilapia. Among the exhibitors were those marketing aeration equipment from PT Sumber Lancar, fish/shrimp larvae counter and diagnostic equipment from PT Kinglab Indonesia and cage culture technology from PT Nefo Plastik (see page 49). PT Suri Tani Pemuka displayed the new focus on marketing marine fish at its booth of (see page 48).

APA13
POSITIONING FOR PROFIT

Positioning For Profit

10-13 December 2013
Ho Chi Minh City

'*Positioning for Profit*' is the theme of the Asian Pacific Aquaculture Conference and Trade Show scheduled from 10-13 December 2013 in Ho Chi Minh City. The conference emphasises the need for the whole industry to take a more strategic approach to expansion.

Simply producing product and getting locked into selling it as a commodity is not the path for industry expansion into the future. New approaches are needed in all areas of business from governance through to research, from harvesting through to marketing, and from education right through the value chain to the consumer.

The conference, which is hosted by the Vietnamese Ministry of Agriculture and Rural Development (MARD), organised by the Asian Pacific Chapter of World Aquaculture Society (WAS-APC) and is supported by Research Institute of Aquaculture No 2 (RIA2) and Asian Institute of Technology (AIT) and sponsored by Uni-President (Gold), Biomin (Silver) and a number of special session sponsors, will have some unique features. There will be 350 oral presentations.

A highlight will be the first appearance in Vietnam of marketing expert, Emeritus Professor David Hughes from Imperial College, London who will present the opening keynote plenary. He will also conduct a workshop on seafood marketing.

Dr Pham Anh Tuan, deputy director general, MARD will be a plenary speaker and will focus on the terrific progress that has been made in aquaculture by Vietnam and will also talk about the opportunities and challenges as the industry continues to build momentum.

Lukas Manomaitis will preside over his last conference as President, WAS-APC, and will hand over the reins to the chairman of the conference and director of AIT in Vietnam, Dr Amrit Bart. Both Lukas and Amrit have a great affinity with Vietnam and are keen to ensure that this event will be a memorable one, especially as it is the first WAS-APC event in South East Asia since 2009.

As most people in the industry know that Vietnam is the third largest aquaculture producing country in the world and Ho Chi Minh City is the centre of its growth, much will be learnt by those attending and engaging in all aspects of the event, ensuring that there will be an exciting stream of oyster expertise engaging the great work done in recent years which has seen production in Northern Vietnam climb to over 7,000 tonnes in just a five-year period.

Trade show

The unprecedented industry interest has seen organisers expand available space and additional trade booths have now become available. The organisers have now planned for a 172-booth trade. At press time, 100 booths have been taken up by companies from all over; Thailand, Taiwan, Malaysia, Vietnam, Singapore, China, Australia, Japan, Brazil, Mexico, Spain, Norway, Netherlands, France, Germany, US and UK, Some of the exhibitors include Topsy Bait, NutriAd, Ferraz Maquinas, GSE Lining Technology, InVivo NSA ASIA / Bernaqua, Uni President, Harvest Co, Dabomb Protein, Insta Pro, Gulf Breeze Aquaculture, Pentair, Pharmaq, Blue Aqua International, Service Aqua, Lessafre, Olmix, GePro, Nutrakol, Range Pharma, Rich, and many more. Universities and trade organisations include VASEP, Nong Lam, NTU and Can Tho universities.

More information: www.was.org. For trade show: Email: mario@marevent.com (Mario Stael)

Farm trips

Ben Tre (full-day) on 14 December 2013
Visit clam farming, shrimp farm, black tiger shrimp hatchery and processing plant for shrimp, pangasius and clams.

Vung Tau (full-day) on 14 December 2013
Boat cruise to visit fish cage farms.
Both trips are limited to groups of 25 only.

Cat Ba (3 day trip) on 14-15 December
Journey includes flight to Haiphong and visit National Marine Broodstock Centre in Cat Ba and visit to an oyster farm in Van Don. Overnight in Halong. Minimum group 10 persons.
More details at the website.

AES, Biofloc Technology Working Group Workshop on Bioflocs, Integrated Aquaculture and Disease Prevention on December 9-10

Review and discussion on data regarding biofloc effects on outbreaks of diseases in shrimp production systems. Reports on controlled research works, through discussion and mutual planning and prioritising. Registration fee is US75 (including workshop dinner and lunch). Contact: Dr Yoram Avnimelech, agyoram@technion.ac.il

Practical Short Course on Feeds & Pet Food Extrusion

January 19-24, 2014
Texas A&M University; College Station, Texas

The Food Protein R&D Center has announced the dates for the one week Practical Short Course on Feeds & Pet Food Extrusion. It will be from January 19-24, 2014 at Texas A&M University. The course will be conducted by staff, industry representatives, and consultants. The program will cover information on designing new feed mills and selecting conveying, drying, grinding, conditioning and feed mixing equipment. Current practices for production of pet foods, preparing full-fat soy meal; recycling fisheries by-products, raw animal products, and secondary resources; extrusion of floating, sinking, and high fat feeds; spraying and coating fats, digests and preservatives; use of encapsulated ingredients and preparation of premixes, and least cost formulation are reviewed. Practical demonstration of pet food, vacuum coating, and several others are demonstrated on four major types of extruders - (dry, interrupted flights, single and twin screw), using various shaping dies.

Reservations are accepted on a first-come basis. For more information, programs and application forms, contact: Dr. Mian N. Riaz, Food Protein R&D Center; 2476 TAMU, Texas A&M University; College Station, Texas 77843-2476. Tel: +1 979/845-2774; Fax: +1 979/845-2744

Email: mnriaz@tamu.edu (Dr Mian Riaz); web : www.tamu.edu/extrusion

What to look forward to in AQUA Culture Asia Pacific in 2014

As we celebrate our tenth anniversary in 2014, we will continue to bring you issues relevant to the industry, predict trends and update you with technologies to help the aquaculture industry in Asia Pacific move to the next level.

Volume 10 2014						
Number	1 – **January/February**	2 – **March/April**	3 – **May/June**	4 – **July/August**	5 – **September/ October**	6 – **November/ December**
Issue focus *Recent developments and challenges for the next step*	Aqua Feed Production	Health Management	Hatchery & Breeding technology	Industrialisation	Sustainable & Responsible Aquaculture	Culture technology
Industry Review *Trends and outlook, demand & supply*	Marine Shrimp	Tilapia	Marine Fish	Catfish	Marine shrimp	Freshwater Fish/Prawn
Feeds & Processing Technology *Technical contributions influencing the final value of aqua feeds*	Feed additives Processing technology	Novel feed ingredients	Phyto ingredients Feed management	Feed enzymes Product quality	Feed probiotics Good manufacturing practices	Nutrition & Formulation
Production Technology Technical information and ideas	Culture & Biosecurity	Genetic Improvements	Recirculation Aquaculture Systems	Hygiene & Food Safety	Certification and Regulations	Health Management
Aqua business Feature articles	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					
Deadlines for articles in 2014	**November 11 2013**	**February 3**	**April 2**	**June 2**	**August 1**	**October 1**
Show Issue & Distribution at these events as well as local and regional meetings ****Show preview***	**Aqua India 2014** 24-25 January Vijayawada, India **Aquaculture America 2014** February 9-12 Seattle, USA	***FIAAP/VICTAM Asia 2014** April 8-10 Bangkok, Thailand **Global Seafood Expo 2014** May 6-8 Brussels, Belgium	***World Aquaculture 2014** June 7-11 Adelaide, Australia	**The Aquaculture RoundTable Series (TARS 2014) - Shrimp Aquaculture** August 20-21 **Vietfish 2014** August 6-8 Ho Chi Minh City, Vietnam	**19th China Seafood & Fisheries Exposition 2014** November China (TBA)	
Deadlines Advert bookings in 2014	**December 3, 2013**	**February 7**	**April 8**	**June 9**	**August 7**	**October 8**

Aquafeed Horizons Asia 2014

April 8, BICC, Bangkok

Aquafeed Horizons returns to Bangkok in 2014 as part of FIAAP Asia/ VICTAM Asia 2014. It will take place on April 8, 2014 at BICC, Bangkok.

Aquafeed Horizons is the gathering place for leading aqua feed producers from the region and beyond, who come to learn about the latest innovations in aqua feed production technology and feed formulation. In 2014, a strong line-up of experts will discuss both processing and nutritional solutions to meet today's aquafeed challenges. It is organised by the aqua feed industry information provider, Aquafeed.com. As a courtesy to the host nation, simultaneous interpretation into Thai will be available.

Previous conferences have included delegates from leading aquafeed companies, such as Betagro, Biomar, Cargill, Charoen Pokphand, Ewos, Fwu Sow, Gold Coin, Inteqc Group, Le Gouessant, Matahari Sakti, National Prawn Company, Nofima, PT Central Proteinaprima, PT Cibadak Indah Sari Farm, PT Japfa Comfeed, Skretting, Thailuxe, Thai Union Feedmill, Tom Boy Aquafeed, United Feeding Co., Vitarich, Woo Sung Feed Co., Zabeel Feedmill – and many more.

To ensure a place and take advantage of the early discount rates, visit the conference website – www.feedconferences.com – to be notified when registration opens. Contact info@feedconferences.com to enquire on sponsorship and presentation opportunities.

2013-2014

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

September 22-27
13th Annual Practical Course and Aquaculture Feed Extrusion, Nutrition and Feed Management
Texas A&M, USA
Web:www.tamu.edu/extrusion
Email:mnriaz@tamu.edu

September 27-28
Biofloc Technology Course
Temasek Poytechnic
Singapore
Email: info:venturefarms@hotmail.sg

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)
Shanghai, China
Web: www.sifse.com/en

October 15-18
High Value Finfish Aquaculture Symposium
Kagoshima, Japan
Web:www.was.org

October 21-23
BioMalaysia & Bioeconomy Asia Pacific 2013
Johor Baru, Malaysia
Web: www.biomalaysia.com.my

November 3-7
Aquaculture 2013
Las Palmas, Gran Canaria, Spain
Web:www.aquaculture-conference.com/

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 & AcuiPeru
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

2014

January 10-12
Indian International Seafood Show 2014 (IISS)
Chennai, India
Web: www.indianseafoodexpo.com

January 24 -25
Aqua India 2014
Vijayawada, Andhra Pradesh, India
Web: www.aquaprofessional.org
Email: aquaindia2014@gmail.com/ aquaprofessionals@gmail.com

February 9-12
Aquaculture America 2014
Seattle, USA
Email: worldaqua@aol.com
Web:www.was.org

April 8-10
FIAAP Asia 2014/Victam Asia 2014
Bangkok, Thailand
Web : www.fiaap.com/www.victam.com

May 6-8
Seafood Expo Global
Brussels, Belgium
Web: www.euroseafood.com/

May 25-30
16th International Symposium of Fish Nutrition and Feeding
Cairns, Australia
Web:www.isfnf2014.org

June 7- 11
World Aquaculture 2014
Adelaide, Australia
Web:www.was.org/ www.aquaculture.org.au

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2013 China Fisheries & Seafood Expo

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When it comes to proven results and return on investment — year after year — China Fisheries & Seafood Expo delivers like no other seafood event in the world.

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

ASIA'S LARGEST SEAFOOD SHOW
www.chinaseafoodexpo.com

Dalian World Expo Center, Dalian, China

For more information contact Jennie Fu
jennie8888@seafare.com

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