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Volume 5 Number 1

AQUA CULTURE

Asia Pacific

Aquafeeds in Asia – margins and trends

Production and outlook for marine shrimp

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HONG KONG *(HEADQUARTERS)* - Gold Coin Group Limited, Room 1204-1207 Shui On Centre, 6-8 Harbour Road, Wanchai, Hong Kong. Tel: +852-2585-1200 Fax: +852-2598-711, email:general@goldcoin.com.hk
MALAYSIA *(JOHOR)*- Gold Coin Specialities Sdn Bhd/Gold Coin Biotechnologies Sdn Bhd, Tel: +607 237 0695 Fax: +607 236 1143 email: sp.koh@goldcoin-my.com
INDONESIA *(NORTH SUMATRA)* - P.T. Gold Coin Specialities Medan, Tel: +62 61 415 5115 Fax: +62 61 451 2748, email: p.zulkarnain@goldcoin-id.com
INDONESIA *(WEST JAVA)* - P.T. Gold Coin Indonesia, Specialities Division, Tel: +62 21 885 3668 Fax: 62 21 884 1947 email: p.zulkarnain@goldcoin-id.com
THAILAND *(SONGKHLA)* - Gold Coin Specialities (Thailand) Co Ltd, Tel: +66 74 483 600/5 Fax: +66 74 483 493 email: w.pradipat@goldcoin-th.com
INDIA JV *(CHENNAI)* - 1-B, Industrial Estate, Ambattur, Chennai 600098, India, Tel: +91 44 2625 8031 Fax: +91 44 2625 8034 email: viney.vatal@godrejagrovet.com

Contents

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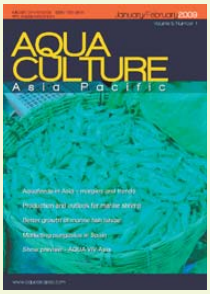

Editor/Publisher
Zuridah Merican, PhD
Tel: +603 2096 2275 Fax: +603 2096 2276
Email: zuridah@aquaasiapac.com

Editorial Coordination
Corporate Media Services P L
Tel: +65 6327 8825/6327 8824
Fax: +65 6223 7314
Email: irene@corpmediapl.com
Web: www.corpmediapl.com

Design and Layout
Words Worth Media Management Pte Ltd
Email: sales@wordsworth.com.sg
Web: www.wworthmedia.com

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3 Pickering Street, #02-36 Nankin Row,
China Square Central, Singapore 048660
Web: www.aquaasiapac.com

Editorial and advertising enquiries
Request for reprints and articles
Email: zuridah@aquaasiapac.com
Tel: +603 2096 2275 Fax: +603 2096 2276

Subscriptions
Online: www.aquaasiapac.com
Email: subscribe@aquaasiapac.com
Tel: +65 9151 2420 Fax: +65 6223 7314

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WRITE TO THE EDITOR

We want to hear from you. Write your comments on the industry to the editor.

Send by fax to Zuridah Merican at +603 2096 2276 or email: zuridah@aquaasiapac.com

Letters may be edited prior to publication

From the editor

Navigating the Perfect Storm

In the last issue of 2008, we postulated that the Asian aquaculture industry would remain resilient and continue to supply the global demand for affordable seafood. Two months have passed and with a little bit more clarity, we need to take another look at the crystal ball. Little did we expect the US sub-prime mortgage debacle to create a perfect storm. Lowering the confidence and feel good factor, this credit crunch has slowed down household spending which, in turn, is leading everyone into a global recession. How will this affect us in 2009? There are two schools of thought.

Let us start with the school of pessimism. The pessimists amongst us stress that this crisis is unlike 1997 where here in Asia, we could export our way out of the crisis. In 1997, while Asia floundered, the EU and the US remained robust with strong consumer spending. The devaluation of the Asian currencies initially destabilised business but once the aquaculture industry found its footing, it started to crank up production for the export market. It helped that costs were low and export prices were good then. As local consumption was poor, exports boomed and with it, foreign exchange earnings.

Today, the export markets of the EU, US and Japan have suddenly turned jittery. Forecasting lower consumption, the supply chain is slowly depleting its stocks, conserving cash for that rainy day. Procurement of letter of credit (LC) which guarantees that the buyer will pay the seller once shipment arrives at the buyers' shore is difficult to get. Buyers are reluctant to pay in advance as it will strain the working capital which the whole world seems to lack today.

The school of optimism says this is a shock to the system but it is only temporary. Once the supply chain returns to reasonable levels, importers will start buying again. They reason that food will be the last sacrifice as consumers tighten their belts. Households will eat out less but they will still have to eat at home. Consumers will look for supermarket house brands that offer value for money. Firstly, this affordable seafood will come from aquaculture and secondly, from Asia where cost of production is competitive.

There is no doubt that there will be pressure on price. Producers of black tiger shrimp in Vietnam have seen prices fall. Should branding come in for it to be a luxury item again and how do we go about doing this? For the vananmei shrimp, I heard a comment that a kilogram of vannamei shrimp (70/kg) at MYR 11.00 (USD 3) will go a long way to feed a family of five. Contrary to popular belief, shrimp is no longer a luxury food item.

This price pressure will hit us quickly but hopefully it will prompt us to react. The fall in commodity prices should allow feed companies to reduce feed prices. Although the feed companies are tempted to delay this as long as possible, it is not recommended as farmers may not continue in their business. The ability the react quickly to this price pressure will determine the sustainability of the Asian aquaculture industry in the short and medium term.

The aquaculture industry is no different from the banking industry in the face of a financial crisis. Smaller and financially weaker operations will have to merge or be acquired by stronger ones. There needs to be consolidation in the industry such that those who remain are stronger and fitter to compete. While this may reduce production output in the short term, it will certainly boost the economies of scale in the industry.

AAP celebrates its 5th year in publication with a fresh new cover for 2009! And that's not all – readers can look forward to technological advances, breaking news and trends impacting the industry.

We wish one and all the very best for 2009!

Zuridah Merican

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The global shrimp

In November, business, associations and government representatives involved in marine shrimp farming were in Guangzhou, China to discuss production trends and to get some forecast on what to expect from major shrimp markets in the near future. The result was a mixed view on the future of this industry.

The Global Technical and Trade conference, held from 6-7 November 2008 was organised by FAO, the Ministry of Agriculture, Guangdong Provincial People's Government, INFOYU and INFOFISH. The two day conference reviewed the regional situation and outlook for the industry in Asia, Middle East and Latin America, markets and marketing, technological issues and certification and regulations.

In the case of the industry in China, representatives from the government saw this as an opportunity to learn from other producing countries. China joining WTO in 2001 had largely expanded the opportunities for the shrimp export industry, said Niu Dun, Vice Minister of Agriculture in his opening address. The country is not only the largest producer but also a large consumer. Shrimp, once a luxury item is now a common product and demand is coming from mass consumers.

On the current status of the global shrimp, he summed this as, "Sustainability of production is gaining importance together with environmental issues and disease control. Regionally, there is severe competition and internationally, non tariff barriers are increasing. Food safety issues are gaining importance and these add to the burden of small producers".

Vice Minister Niu Dun of Agriculture (left) and Professor Qisheng Tang, Yellow Sea Fisheries Research Institute, Qingdao, China.

Shrimp farming and sustainability

Helga Josupeit, Fish Products and Industry Division, FAO said that the issue of mangrove destruction may be passé as major producing countries have protection measures for mangroves which also include mangrove planting programs. Zero exchange of pond water minimizes the effects of waste water effluent on the environment. The use of antibiotics is also closely monitored by producer countries. Fish meal for feed production goes through stringent quota systems. However, additional threats are seen with high stocking densities. The future will also consider carbon food miles which is the distance the food travels before it is consumed and is a measure of environmental impact. The subject is being pondered particularly as shrimp is produced in the tropics for consumption across the world.

From Left, Helga Josupeit and Dr Audun Lem, Fish Products and Industry Division, FAO.

Production sustainability was discussed by **Tarlochan Singh**, Infofish who introduced innovations in organic black tiger shrimp farming in Thailand. Production of organic shrimp also has a large potential. Selective breeding and technological innovations in farming systems has now revived the culture of the Chinese shrimp *Fenneropenaeus chinensis*, said **Dr Wang Qingyin**, Yellow Sea Fisheries Research Institute in Qingdao. In 1980, it was the main species with 200,000 tonnes and led China in shrimp production. Species degradation reduced production in 1990. Work on 7 generations of the shrimp selected for growth has led to an increase to 42,257 tonnes (Infoyu, 2008) with a new strain 'Huanghai No.1' cultured in Shandong, Hebei, Jiangsu, Liaoning, and Tianjin provinces. The ten year effort has continued for disease resistance traits of the shrimp and will result in 'Huanghai No.2'.

Shrimp in Guangdong Province

Shrimp as a promising species was aptly depicted by the industry in Guangdong Province. **Li Jianhua**, Director General, Bureau of Fisheries said that shrimp farmers have moved out of poverty. In 2007, Guangdong produced 430,057 tonnes of marine shrimp (212,684 tonnes of vannamei shrimp in inland areas, 183,256 tonnes of vannamei shrimp in saline areas and 34,117 tonnes of monodon shrimp, Infoyu, 2008). Guangdong produces 32% of China's total production of 1.2 million tonnes of farmed shrimp. Exports total 100,000 tonnes which is 54% of the total shrimp export of China. Naturally there is a big push to expand production. However, it needs to meet the challenges of reducing costs of production. The challenges for exports are the strong value of the Chinese Yuan and international food standards. Production will be maintained and measures taken will include improving quality, resource conservation, planning and infrastructure and adding value of products. This requires the implementation of regulations and monitoring of production and traceability systems compatible with international standards.

Shrimp and the global fuel, food and financial crisis

Increases in fuel cost has had its toll on the feed, farm and processing operations of the shrimp farming business, said **Dr Panisuan Jamnarnwej**, Thai Frozen Foods Association. The effects on transport were moderate in the farm and processing operations but high in feed production. The overall result was an estimated 15% increase in costs. The most critical cost impact was that on raw materials. In Thailand, high oil prices also saw the conversion of 5% of farms into oil palm plantations for biofuel production.

The silver lining with shrimp farming is that in terms of fuel usage it is a more efficient method of food supply than capture fisheries. As a portion of the total cost, the fuel cost for farming shrimp is less than 20% as compared to more than 60% for capture fisheries.

"However, in this current downturn, consumer sentiments work against the shrimp. It is not a staple protein but a luxurious item and will not be bought when the family is on a budget. The food service is expected to shrink by 22.5%".

Shrimp in the future

Dr Audun Lem, Fish Products and Industry Division, FAO in his presentation on the future of shrimp said that since 2007, declining producer prices contrasted with increasing costs of production. Shrimp farming is increasingly competitive. Although volumes have been increasing, mainly due to the introduction of the vannamei shrimp in many countries, the value of production has risen only moderately. Shrimp still has the image of a luxury item which depends on the restaurant trade. A weaker demand is expected in 2008-2009. In future, the fastest growing segment will be value adding which will also have the highest value of exports.

From left: Dr Panisuan Jamnarnwej, Thai Frozen Foods Association and Krissana Sukhumpanich, Department of Fisheries Thailand.

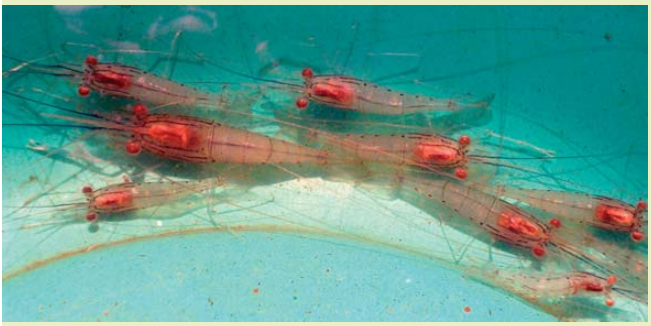
The hope to increase consumption is in the producer countries, said Audun. In less than five years, China has increased consumption to 833,000 tonnes in 2005. A local market with a good price (USD3.7/kg) may mean that China could become a net importer. Brazil increased domestic consumption from 10% to 60-70% in last 5 years. This is now happening in Asia as well. Domestic consumption is being promoted in Malaysia, Thailand and Indonesia at prices of USD 3-5/kg. (See page 26 for industry review)

First harvest of organic freshwater prawn

Farmers in Kerala State harvested the world's first batch of organic freshwater prawn or scampi Macrobrachium rosenbergi as part of the Indian Organic Aquaculture Project.

This farming of the organic black tiger and scampi was first initiated in January 2007 in the states of Andhra Pradesh and Kerala by the Marine Products Export Development Authority (MPEDA) and Switzerland's State Secretariat for Economic Affairs (SECO), formerly SIPPO. Technical consultancy came from M/s Blueyou. The aim is to capture the niche market for organic aquaculture products in EU markets.

Organic scampi culture began in Kuttanad in Alappuzha District, Kerala. The area is already well known for scampi farming because of the presence of extensive padasekharams (rice fields) and ponds. In the 20 ha of freshwater pond area operated by the Kuttanad organic scampi farming group, MPEDA provided technical information on pond preparation. Post larvae (PL10) were supplied by Rosen Fisheries Hatchery. Stocking density was 2 PL/m^2, initially in nursery ponds and then transferred to grow out ponds. In this project, Rosen supplied 34,000 post larvae, stocked in March/April 2008 in 20 ha of ponds belonging to four farmers in Kerala and 80,000 post larvae to 33 ha of ponds belonging to two aquaculture societies in West Godavari, Andhra Pradesh. Two other hatcheries, Queens and St John Bosco, will also produce organic post larvae of the black tiger shrimp.



Organic Macrobrachium juveniles. Picture courtesy of Dr C. M.Nair, Dean Faculty of Fisheries, Kerala Agricultural University

Shrimp were fed with organic feeds produced by Waterbase Pvt Ltd. The company has a Naturland certification for organic starter, grow-out and finisher feeds for the scampi and black tiger shrimp. Ingredients comprise rice bran, soybean meal, wheat bran, vitamins and minerals premix and guar gum as binder. The project also identified Baby Marine International in Kochi and Jagadeesh Marine export, Andhra Pradesh for the processing of organic products.

Certification is mandatory for selling organic products in most markets of the world and the certifying organization for products from this organic aquaculture project is Naturland, Germany. The local inspection body for Naturland is Indocert of Kerala in India which conducted training for all participating groups on the control systems, technical know-how of organic farming and its other prerequisites in August.

News in brief

US shrimp imports increase

According to a December 2008 report by the National Marine Fisheries Service, shrimp imports rose in October by 10% as compared to imports in October 2007. The volume of imports is expected to reach a billion pounds in 2008, exceeding the import volume of 1.23 billion pounds in 2007. The top exporting country is Thailand with 322.6 million pounds but down 4.6% as compared to the volume in 2007. Indonesia shipped 164.2 million pounds of shrimp to the US, up 51.3% from 2007. Shrimp imports from China and Vietnam were up 7.2% and 17.4%, to 88.7 million and 81.5 million pounds, respectively.

Hatchery expansion for UP

Uni-President Group plans to build two more hatcheries to supply SPF vannamei shrimp post larvae to farmers. It has a hatchery in Ninh Thuan, Vietnam with an estimated annual capacity of a billion post larvae in 2009. The new hatcheries will increase the annual capacity to 4 billion post larvae, announced Wu Hsu-Hui in the Earth times. The annual demand for vannamei post larvae in Vietnam will equal 25 billion. UP also has two aqua feed plants in Vietnam, in Binh Duong and Tien Giang. The new hatcheries will be in Ben Tre and fully operational in 2010. In 2009, the focus of UP will be on vannamei post larvae production. A processing plant will follow, once the hatchery business proves successful.

No antibiotic residues in aqua products

The Food Safety Authority of New Zealand (NZFSA) has tested 30 random samples of imported land-based aquaculture products (ILBA) from Thailand, Vietnam, India, Japan, China and Peru for triphenylmethylene dyes, nitro furans, chloramphenicol, sulphonamides and tetracyclines. These samples showed no detectable levels of residues from antibiotics and other antimicrobial drugs. NZFSA last sampled land-based aquaculture foods from China in July 2007 and found few samples with residues at very low levels with no risk to health. These are routine checks on high-risk goods, which are tested at the border.

Thailand tilapia exports soar

Thailand's tilapia exports for January-October 2008 reached 16,733 tonnes, valued at THB1,014.6 million, said Poj Aramwattananont, President of the Thai Frozen Foods Association. Exports to the US have increased 3,255 tonnes and to the EU up 1,514 tonnes. Exports by the end of 2008 will grow more than 90% year-on-year. Thailand expects to produce 300,000 tonnes of tilapia in 2010 and export 50,000 tonnes.

Tilapia crisis in China

Over production has reduced wholesale tilapia prices from USD 1.60/kg to USD1. In SeafoodSource, experts said that the problem of oversupply is illustrated in Wenchang, a centre of tilapia breeding in Hainan Island where culture area increased from 800 million m^2 to 868 million m^2. They also face falling exports and profit margins. Tilapia exports to the US fell 30% between October and December. Exports have also dropped in other key markets such as Russia, Israel and Mexico, according to www. jsof.gov.cn.

ASDD in *Penaeus vannamei*

In Thailand, the team led by Waraporn Sakaew from Mahidol University has suggested that abdominal segment deformity disease (ASDD) in white shrimp may be caused by a new virus that primarily invades neural tissue and results in neuromuscular dysfunction and abnormal morphology. Since 2004, shrimp farmers in Thailand, Malaysia and Indonesia have complained of cultured shrimp that grow and survive normally but have abdominal segments that are enlarged or twisted laterally and/or dorso-ventrally, sometimes accompanied by opaque muscles. To study the cause, affected shrimp were tested by polymerase chain reaction (PCR) methods for the presence of several known viruses. The full paper is published in Aquaculture, Vol 284, pages 46-52, November 2008, available online at www.sciencedirect.com.

Cut in Thai shrimp output

The Thai Shrimp Association and Thai Frozen Foods Association have asked farmers to cut shrimp production by 20% to lift prices. Ex-farm shrimp price was THB 115/kg (50 shrimp), down 15% from the same period in 2007. In the Bangkok Post, Somsak Paneetatyasai, President of the Thai Shrimp Association said this would allow producers to retain the export price at the current USD3.04 per pound. The value of shrimp exports would remain at USD 2.3 billion in 2009, with a 5% growth for an expected volume of 360,000 tonnes. In 2007, exports of 340,000 tonnes were valued at USD 2.43 billion.

Black tiger shrimp centre

The National Fisheries Development Board (NFDB) in Hyderabad is planning for a specific pathogen-free (SPF) black tiger shrimp multiplication centre in Andhra Pradesh with Moana Technologies as the technical partner. In the Business Standard, three companies have responded to the expression of interest for setting up the centre and the tendering process will be initiated shortly. The multiplication centre will have an annual capacity of three billion post larvae. It added that Moana has initiated a jump-start program and has supplied 1.65 million post larvae to 13 farms in the coastal districts of Andhra Pradesh. NFDB is evaluating the performance of the post larvae.

Keeping to the circle of control

By Zuridah Merican

Before deciding on his plans for the year's culture cycle, Chaiwat Tientongkam looks at what the market demands and adjusts accordingly.

Some 12 years ago, Chaiwat left the hotel industry to move to the serenity of Amphur Lamlukka, Pathum Thani province and started a small marine shrimp farm with only 3 ponds. Two years later he had a total of six ponds. By the 5th year, he expanded to 25 ponds in 90 rai (14ha) and in the 10th year another 11 ponds of 50 rai (8ha) was added. Currently, he cultures the white shrimp *Penaeus vannamei* in the 50 rai site and black tiger shrimp *P. monodon* in the separate area of 90 rai. The culture of these two species is to meet the demands of two markets, live black tiger shrimp for export to China and chilled white shrimp for the Korean market.

"Before I start my crop, I will ask the broker on what is the market requirement. This time, the black tiger shrimp is cultured for the production of live shrimp of 60-70 pcs/kg for export live to China. Harvest is targeted for the months of November to May when supply is low in China. From May, culture is shifted to vannamei shrimp in these ponds." said Chaiwat.

By thinking out of the box, he has managed his business to the current level of success is. During the months of April, May and June, he concentrates on pond preparation.

"This is to think differently. I do not follow others. When they have stocked their ponds, I am still preparing my ponds. In May to June, there are less celebrations and so demand is lower and prices are also lower", said Chaiwat.

Chaiwat (middle) with Jirasak Pimnamkam (left) and Koanwan Loylerd, Inteqc Feed Co Ltd.

The ponds use long arm aerators, common in Thailand. Chaiwat has recommended the use of electricity to cut costs. The capital costs of an electrical engine is 10% that of a diesel engine and energy costs are THB 80,000/mth (USD 2,323) versus THB 150,000/mth (USD 4,357) for diesel.

"There are now around 200 ponds in this area. I have been practising this for several years and now other farmers here are following this model so that what and when we produce will be dictated by the needs of markets".

Start with good pond preparation

The key factors for his success are good pond preparation, a good breed of post larvae and good feed management in that order. Chaiwat spends 1.5 months in pond preparation. He does not use any probiotics during pond preparation. All these will ascertain that the production will be according to his planning in terms of uniformity of size of shrimp and days of culture. To demonstrate how his cycle is not synchronised with that of most farmers, Chaiwat said that he is still in pond preparation when others have already started stocking.

Obtaining the best possible post larvae is critical. Current prices for post larvae range from THB 0.07-0.08 each (USD 2.03/1000 post larvae) depending on the source.

"The best post larva is important for me. I cannot control post larval quality whereas I can control the other aspects such as water and feed management. When I buy post larvae through feed companies such as Thai Union Feed and Inteqc Feeds, I can be assured that shrimp grow uniformly and with this, I get better prices for harvested shrimp. Whereas, when I purchase from a small hatchery, I usually have problems", said Chaiwat.

His latest purchase of post larvae is the turbo shrimp, marketed by Charoen Pokphand (CP) in November in Cha-chaengsao province. These cost as much as the most expensive post larvae in the market when package with feeds or 27% more if it is not packaged. Chaiwat has decided to try the post larvae. (The shrimp is the result of five generations of selective breeding in Thailand. Some 1000 families were evaluated for survival, disease resistance and growth rates. Growth in each generation has improved 45% since 2005, according to CP).

The target size for this batch of white shrimp is 50 pcs/kg (20g shrimp) in less than 4 months with an expected survival rate of 90% and with a one-time harvest. Stocking density is now 60,000/rai (37 PI/m^2; one rai equals 1,600m^2). In previous crops, the average survival rate was 85% at a stocking rate of 40,000/rai and 120pcs/kg was produced after 60 days of culture and 70-80 pcs/kg in three months. Ex-

36 day and 3g vannamei shrimp in feeding trays

Black tiger shrimp in feeding trays

Feeds from two feedmillers in the feed store in his compound.

farm prices (November 19, 2008) was THB90/kg for 70-80pcs/kg (USD 2.61/kg). Generally, there are two cycles of vannamei shrimp production.

The stocking density for black tiger shrimp is 210,000/3 rai (43.75/m^2) and post larvae are purchased from a local hatchery. Profit margins are good at farm gate prices of THB 180/kg (USD 5.23/kg) and cost of production is THB 80/kg (USD 2.32/kg)

Water management is also critical. Incoming water is filtered. Water is pumped in once only and is disinfected before stocking. There is no water exchange during the culture period. During the grow-out probiotics are used in the ponds only after 60 days of culture.

In feed management, the farm uses feeds from three companies. "The choice of feed and usage depends on species and stage of culture. For example, feeds produced by Inteqc Feeds for black tiger shrimp culture are used for the early stages of culture, notwithstanding the species under culture. The exception are ponds stocked with the turbo shrimp which only uses CP feeds. Feed conversion ratio ranged from 1.35 to 1.4", said Chaiwat.

Adjusting salinity

As the ponds are located inland, Chaiwat has developed a procedure for increasing the salinity of water in ponds. At the hatchery, post larvae can be acclimated to as low as 10 ppt but his ponds are freshwater ponds. Thus, in his ponds, he stocks the post larvae in an enclosed area of the pond where saline water of 15 ppt is created using seawater from nearby salt pans. The water is brought in at a cost of THB 3,000/truck holding 10,000 litres (USD 87.12). In the rest of the pond, water salinity is gradually reduced from 15ppt to 10 ppt and to 0.4 ppt when water is mixed on the second day of stocking through a 7inch pipe. Without such a procedure, Chaiwat said that he will not be able to culture shrimp. The selling price is worth this effort in adjusting the salinity of the pond water.

Outlook

Despite the gloom in the industry with many leaving the industry and a suggested cutback in production by the Thai Shrimp Association, Chaiwat believes that demand and supply will dictate how he continues his business. A lower supply will mean better prices. If the demand is lower, he will continue farming but will reduce stocking density. Nevertheless, he expects demand will pick up during the New Year celebrations. Information on the market and demand will be provided to him by the shrimp buyer who will also help to forecast the future demand.

On whether he is considering further expansion, Chaiwat said, "Now I have enough enough ponds to handle. With too many ponds, there can never be sufficient control. The current number is good for me".

Industry squeezed and high feed costs to remain

Feeding catfish in the Mekong Delta, Vietnam

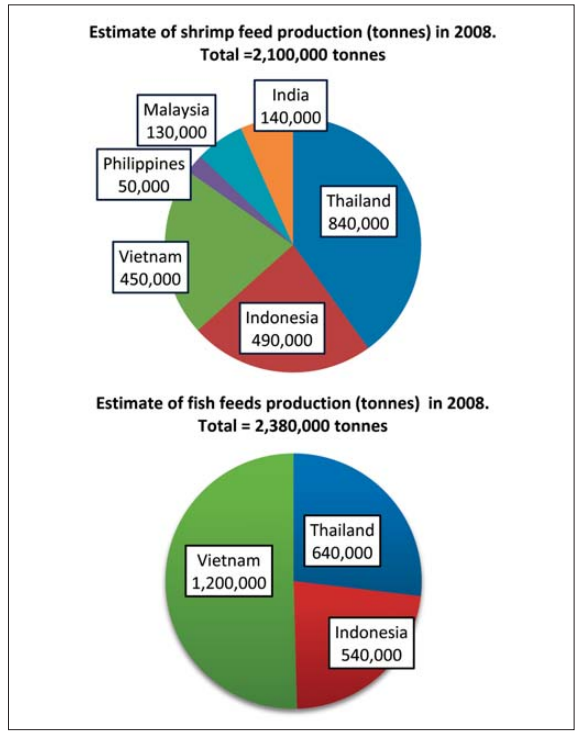
Producers reach out to farmers for understanding as commodity prices affect their economic health. A delay in reducing feed prices is expected. AAP reports

The estimates on shrimp feed production in figure 1, compiled with information from industry showed that production increased in Indonesia, Vietnam, Philippines and Malaysia and declined in India and Thailand in comparison with production estimates in 2007 (AAP, 2008). The 2008 production of pelleted and extruded feeds for the freshwater fish was estimated at 1.2 million tonnes in Vietnam, 640,000 tonnes in Thailand and 540,000 tonnes in Indonesia. Extruded fish feed production is increasing in India (see page 49). Local production of marine fish feed in most countries is also increasing.

Cross border trade in both shrimp and fish feed is substantial. Malaysia, imports shrimp feed from several feed mills in Thailand, estimated at 20,000 tpy. Imports are also from Vietnam, China and Indonesia, estimated at 3,000 tpy of shrimp feed. Shrimp feed imports into the Philippines from CPF Thailand was expected to reach 10,000 tonnes in 2008 (Nation, 9/1/08). Dzung (2008) said that fish feed imports into Vietnam from Thailand, China and Taiwan totalled 170,000 tonnes in 2007. Indonesia and India are also net importers of shrimp feed. Shrimp feed production data in Thailand, Indonesia and Malaysia indicated 80% of capacity utilisation and 67% in Vietnam. In Bangladesh, 10,000 tpy of shrimp feeds were imported for black tiger shrimp farming (Barman and Karim, 2007).

China's feed production was 13.26 million tonnes in 2007, including 3.1 million tonnes of feeds for the shrimp, prawn and crab (Mai, 2008). In Bangladesh, Barman and Karim (2007), reported a production of 50,000 tonnes of fish feeds for the tilapia, catfish and climbing perch and 10,000 tonnes of shrimp feeds in 2005.

Figure 1.



Shrimp feeds

Although feed production is species specific, volumes change according to farmers' preferences. The trend is for vannamei shrimp farmers to use the nutrient dense monodon 0-2 starter feeds and then shift to the cheaper and less dense feeds for the rest of the culture period, said Zul Pasaribu, Gold Coin, Bekasi Feedmill. The key factor is the protein content in feed and demand is still good for the premium feed range. However, demand of the type of feed continues to fluctuate with shrimp prices; i.e. higher grade feeds demanded when shrimp prices are up

We could talk all day about our aquatic feed systems.

But we'd rather talk about yours.

Joe Kearns, *Aquaculture Process Technology Manager*

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The team at the Uni President Vietnam (UPV) laboratory in Tien Giang. The free service for UPV customers include tests using a PCR for WSSV, MBV, YHV/GAV, IHHNV,TSV etc with information provided within 24 hours. The uniqueness of the laboratory is a chip technology system (PCR technique and hybridization, detection and colorimetric development and analysis software) which allows it to test for adulteration of ingredients such as in fish meal. There are 6 species such as porcine, bovine, goat, sheep, poultry and fish which can be tested. A separate facility checks shrimp quality in the Central region.

Starter shrimp feeds used to feed tilapia fry in Guangdong China.

and vice versa. Only 30% of shrimp feed production in Vietnam was vannamei shrimp feed whereas the production is nearly 100,000 tonnes of vannamei shrimp in 2008.

Fish feeds

By species, the highest volume was catfish feeds, mainly extruded in Vietnam where production was estimated at 80% of capacity. In Indonesia, pelleted common carp feeds are used for culture activities in the large reservoirs of Cirata. In 2008, a decline in demand was reported according to Anang Hermanta, PT Sinta Prima Feedmill due to upwelling in the reservoir which occurred twice in 2008.

Anang Hermanta, Marketing Director, PT Sinta Prima Feedmill

In a large commercial farm in Central Jawa, similar occurrences also reduced feed demand.

Managing risks

The high prices for feed ingredients, from fish meal, soybean meal, wheat meal, cassava to certain minerals, vitamins and feed additives continued into 2008 (see page 17 on the global commodity market). During the period of high commodity prices, it was usual for the owner or CEO to take over purchasing. In Thailand, to overcome soaring costs, the purchasing department opted for long-term contracts, when possible and when prices are moving upwards. In terms of oil seeds, many producers switched to import soybean meal from India. Due to increasing freight costs, feed millers were keen to purchase corn, soybean and cassava from Laos, Cambodia and Myanmar. Formulators looked at every possibility to reduce costs by using by-products such as rapeseed meal and palm kernel meal (Buranakanonda, pers comm.).

Hedging raw material prices is a common practice. What we see is that feed companies rarely extend credit. If they do so, it will be only for large and established farms. Usually dealers giving out credit absorb the risks in instances of non payment, crop failures and also increases in prices. Those involve in shrimp contract farming or integration, locate technical staff in farms to prevent crop failures.

Increasing feed prices

In 2008, feed volumes increased and so did the value but feed producers felt the squeeze in profits. Although raw material prices have escalated by up to 50%, the raw material component of feed production has gone up by 8% helped by novel raw material and reformulation. The energy portion of feed production has gone up by 30% and reduced margins. Declining farm gate prices added to the woes of farmers and all upstream industries. Steps to pass on costs to farmers varied from multiple increases but in small amounts to one to two large increases. In Thailand, the government only allowed feed producers to increase prices in June/July 2008 and only by 20%, said Dr Chen Ming Dang, CPF. It is anticipated that soon the government will instruct producers to reduce prices.

In Indonesia, fish feed prices increased three times. However, the feed industry where some 75% of ingredients are imported had another problem; the rise in the value of the USD dollar which moved from IDR 9,400 to IDR 11,600 (in October) and to IDR 11,125 (30/12/08). There is also the high interest rates (17%) initiated by the government to combat inflation. The top fish feed producer, PT Sinta Prima Feedmill, increased fish feed prices to a total of 26%. Even with this they cannot balance costs and selling prices.

"We had to really reach out to the farmers to explain to them the necessity of increasing prices. However, we were also helped by concurrent increases in farm gate prices of fish such as from IDR 9,000 to IDR 13,000 for the carps in Cirata lake, the major market for our feeds", said Candra Yanuartin, in Jakarta in November 2008. "We are a conservative company, pioneer in fish feed production and the trust of the farmer is important for us. We need to maintain consistent quality".

In Vietnam, catfish feed prices were raised three times during the first part of 2008. The higher price for the 26% crude protein catfish feed is VND 8,000 VND, versus VND 7,000 in December 2007, said Vo Thi Kim Hang, Viet Long. The price for 22% crude protein increased from VND 6,250 to VND 7,700. Production increases were not only attributed to rising raw material prices,

Vo Thi Kim Hang, Vietlong Feeds, Vietnam

which are imported except for cassava meal, but also a 15% increase in electricity tariffs. Concern for quality rather than cost savings meant that some large and established producers did not change their formulation and raw material consumption.

In the Philippines, Christopher Co, Overseas Feed Co, Cebu, Philippines, said that prices for tilapia and milkfish feeds increased three times but these were small increases at a time. Prices of feed for the culture of high value fish increased by 10% and for shrimp feed, a small increase once during the year was implemented. In general, increases were due to the high cost of raw materials, petrol and electricity charges. Similar to the situation in Indonesia, high prices for the milkfish and tilapia cushioned increased feed costs.

Christopher Co, Overseas Feeds Corp

However, with stiff competition, it was reported that some producers tried to relieve the burden on some shrimp farmers with perhaps a one-two weeks of buy-ins at the old price. In some locations, such as in Lampung, Indonesia where 60% of culture is based on financing by dealers, the impact of price increases was less.

When to lower prices

Since mid 2008, there has been relief for industry with lower commodity prices and accompanying drops in petrol prices. Understandably, shrimp and fish farmers are expecting cuts in feed prices. A feed miller in Indonesia said that it will not immediately reduce feed costs as they are holding stocks bought at high prices. Feedmillers commonly hedge prices for three months but may be forced to stretch the consumption out of six months as either sales fall or it could be a deliberate strategy to bring down prices in smaller steps over a longer period of time.

Christopher Co, said, "We are not planning to bring down prices just yet. Although the prices of raw material such as soybean meal have gone down, prices of local ingredients such as copra meal and rice bran are still very high. Feed prices have adjusted upwards several times, the increase is still insufficient to cover for increase in raw material costs. Prices of fish meal in US dollar terms are steady. Domestic freight charges have not gone down to reflect the drop in fuel prices. We expect a delay of at least 2-3 months before we can bring down prices following the trend when freight prices rose only two to three months after the rise in fuel prices. I do not think that shipping rates will go down quickly unlike the airline rates. Truckers, important for us in the Philippines archipelago, have not brought down prices".

Bundling services

The linkage of feeds and post larvae supply is getting stronger with the increase in demand for specific pathogen free (SPF) stocks of vannamei shrimp. Other services are diagnostic services and when the feed company does not have post harvest processing facilities, assistance in marketing shrimp.

'one stop shop for feed and post larvae'

This trend of upstream integration is most evident in the Philippines and Vietnam as these countries are building up supplies of SPF vannamei post larvae. In the Philippines, the certification of a hatchery is tightly regulated by the Bureau of Aquatic Resources (BFAR) and prerequisites are that it must be dedicated only to the vannamei shrimp and is complete with the essential biosecurity features. It can only use broodstock imported from the US. The capital intensive investment means that opportunities are only open to feed producers and major hatcheries. In Vietnam, all the major shrimp feed producers have hatchery facilities in Ninh Thuan. Uni President Vietnam, is also expanding with two more hatcheries (see news in brief, page 6). CJ Feeds in Indonesia also sees the setting up of a hatchery as part of its road map to focus on supply of SPF post larvae initially to East Java, Bali and Lombok, said Haris Muhtadi.

Haris Muhtadi, General Manager,CJ Feed Jombang

In November, Christopher Co said, "We have started our hatchery and expect the first production of post larvae in December 2008 for stocking in January and February. Oversea Feeds provides post larvae to selected clientele. As domestic airlines have shifted to the more fuel efficient propeller planes in several routes and these can only carry limited cargo, the areas that we can serve are limited. Our option is to transport by boat overnight."

Supply of fingerlings is less established with the fish feed production sector. In Indonesia, PT Sinta Prima Feedmill has been operating a hatchery for tilapia. The hatchery initially started with the production of the carp.

Diagnostic services

Major feed millers usually have quality control laboratories and additional diagnostic and analytical equipment such as polymerase chain reaction (PCR) have allowed them to service clients better. This is the case of the Uni President Vietnam's new laboratory in Tien Giang which specifically serves clients in the Mekong Delta. However, CJ Feeds in Indonesia cooperates with government research centres. Haris said

Table 1. Prices/kg for selected grower feeds in December 2008.

Prices	Currency and exchange to one USD (30.12.08)	Marine shrimp		Freshwater fish (%CP)	Marine fish
		monodon (%CP)	vannamei (%CP)		
Thailand	THB 34.74	36 (38%)	34 (32%)	Tilapia-31.5 /33 Catfish-31.5 /33	50-60
Phil	PHP 47.39	51-55	41-45	22 (25)	50
Indonesia	IDR 11,125.93	10,500 (40%)	9500-9800 (34-32%)	5,400 (6,600 extruded)[1]	13-14,000 (43-45%) USD 1.5-1.6 for imports
Vietnam	VND 17,503	20,900 (40%)	16,500 (38%)	Catfish - 7,800-8,000 (26%) 6,500-7,000 (22%)	16,000-17,000/19,600 (44%) USD 1.30-1.50 for imports)
India	INR 48.12	55 (40%)		14 (21 extruded)[1]	
Malaysia	MYR 3.49	3.80 (40%)	3.40 (32%)	Tilapia - 2.50 (28%) Catfish - 2.40 (26%) to 2.50 (30%)	3.50-4.00 (40-42%) 4.75 (45-47%)

[1]*prices for general freshwater fish feeds used for tilapia, carps and catfish farming*

that with the technical expertise on disease detection at the centres, errors in disease detection work are minimised. There are five research centres in Jawa and Bali, one in Lampung and two in South Sulawesi with PCR facilities.

Marketing services

Small producers in Asia require help in marketing. This is a common role taken up by feed companies for their clients. Christopher said, "Usually we link shrimp farms with processors. However, we do help small vannamei farmers, producing for the domestic market, to supervise harvesting, pack and transport. This is similar to the situation with milkfish and tilapia where the grower has to bring the produce to the market. This is a service, usually for the first few harvests."

He added that in the Philippines, vannamei shrimp is mostly sold in the domestic markets and thus there must be coordination as the market can only absorb a certain volume and farms do several partial harvests. Prices are decreasing as more players start vannamei shrimp culture with some carrying out intensive culture at 200 PL/m^2. Only the typhoons and actions of BFAR which is limiting the availability of post larvae, is keeping prices up.

In Indonesia, Zul and Haris said that farmers now ask for more information on markets and prices and use the information to plan their future stocking density and production cycle.

Developments

Raw material utilisation

As more plant meals are added into fish feeds, it is now common to use phytase to utilise the phosphorus present in feed ingredients and reduce the need for inorganic supplements. This was especially important with the escalating prices of DCP in 2007 and 2008. The highest price was USD850/tonne in July 2008 which is currently sold at USD 360/tonne (December, 2008). Many feed mills are using PPLA technology, especially mills producing catfish feeds (Lorenz-Meyer, 2008). Prices of phytase range from USD 9-12/kg. In Thailand, phytase is also available at THB 100/kg (USD 2.9/kg).

Nutrition and feed formulation

The feed formulation must be adjusted to the low salinity culture of the shrimp in terms of magnesium, potassium, Vitamin C and E, said Professor Mai Kangsen, China Ocean University in Guangzhou. Higher dietary protein may be required. Information on digestible protein and P:E ratio are still unknown. He added that the areas which require further research is substitution of fish meals with plant meals which will depend on the density of culture. As China depends on imported fish meals, successful replacement with other protein sources is critical. Other applications include immune enhancers, prebiotics and probiotics, bacterial pepticoglycan, glucan and *B. subtilis* and *B. megaterium* and the effects of Chinese herbs.

Feeding management

Lowering production costs is achieved through improvements in average daily growth (ADG), reducing days of culture (DOC) and stocking density (SD) and higher harvests. At the Shrimp Academy in Thailand, Mati Nitibhon (2008), showed that ADG was improved with selective breeding, feeding management and use of pond liners. Ideally ADG should be 0.16g at SD of 110 PL/m^2 and DOC is 90 days for 60 pcs/kg. In Indonesia, the use of pond liners for 2.5 crops and low stocking density produces a higher harvest, according to Zul. Mai (2008), said that in China, work on feeding frequency showed that feeding three times a day improves feed efficiency. Research in China has showed that salinity fluctuations of every four days result in higher growth rates than a constant salinity condition and greater feed intake (Feng, et al., 2008). The range of feeds designed by CJ Feeds for moderate stocking density (75-125PL/m^2) is effective in increasing growth rate and improving FCR, said Haris.

Feed conversion ratio

This is the key selling point for both fish and shrimp feeds. In Indonesia, Haris said FCR for shrimp feeds range from 1.4-1.5 to 1.8. In China, Mai Kangsen said that the FCR for shrimp feeds range from 1.0 to 1.2. The range is dependent on survival rate which is higher at 80-90% for the vannamei shrimp compared to 60-70% for the monodon shrimp. The actual FCR achieved at the farm will depend on feed management strategies and the length of the culture period. Generally, the root of all differences in FCR is the contribution of natural productivity which is rarely accounted for, said D. Allen Davies (see page 21).

The average FCR quoted for fish feeds in Indonesia are 0.9 to 1 for the Clarias catfish, 1.25 for size 250g tilapia and 1.75 for one kg tilapia. In contrast, the best FCR for Pangasius catfish feeds quoted by feed companies range from 1.5 to 1.6 while 1.8 will draw complaints from farmers. At this

FCR, there are now doubts on the specifications of diets which have been based on formulations for the *Ictalurus* catfish and tilapia, as little is known on the nutrient requirements of the Pangasius catfish.

Brett Glencross, University of Western Australia, said, "In the Pangasius catfish industry, FCR values of 1.5 to 1.8 are often quoted. However, based on laboratory experiments using the same feeds FCRs rarely drop below 2:1. In fact trials run at CanTho University resulted in FCR of 2.1 and 2.6 with a commercial feed when fed to 60g and 130g fish respectively. So for production through to the full harvest size animals this FCR would only escalate. Clearly natural productivity in ponds plays an important role in keeping the industry FCR below 2:1. Based on our bio-energetic modelling and the recent validation of these models with Pangasius catfish, it is clear that most diets are underspecified in terms of the digestible protein:digestible energy ratio. By better managing this we have a real chance of keeping the feed value FCR below 2 : 1 and therefore immediately put ourselves further ahead in terms of total potential production efficiencies".

Feed and food safety

As part of the supply chain and in the current environment of doubt, shrimp/fish buyers are asking for sample of feeds and testing for contaminants. With recent reports on adulteration with melamine, quality control of raw material and finished feed is vital. Melamine used to increase nitrogen content in feeds first surfaced five years ago, according to Xinhua news agency. It added that this is not the only contaminant. Some domestic fish feed is contaminated with other products, such as powdered shell or spices. Mai Kangsen said that in his view, the aqua feed industry was the largest destination market for waste melamine in China. In Hong Kong, fish feed sourced from China was contaminated with 6.6 ppm melamine. Although fish samples tested were satisfactory, Hong Kong authorities have fixed a detection limit of melamine in animal feed at 2.5 ppm. Vietnam has also set the same limits for raw materials and finished feed.

New markets for local production

The potential demand for commercial fish feeds in India for Indian carps and the Pangasius catfish is estimated at 2.3 million tonnes based on a FCR of 1.0 (Suresh, 2007). The success of the RGCA demonstration cages for seabass culture is leading to efforts to reduce feed costs and replace imported floating feeds with local production. Future species in these cages are the cobia and grouper. Aside from PT Matahari and PT Suri Tani Pemuka (STP), in Indonesia and Uni President in Vietnam, several local companies in these countries have started preliminary work to produce marine fish feeds. The bulk of the marine fish feeds used in cage culture are imported, mainly from Taiwan.

Outlook

Within the current situation of uncertainty, demand for feeds in 2009 remains in a flux. By country, some indicators are that shrimp production should increase by 20% in Indonesia but comprising smaller shrimp which requires less feed. Another opinion is that the feed market in Indonesia may increase slightly because of the revitalisation program. Demand for shrimp feed in Malaysia may increase with success of a large farm and expansion of culture area to meet targets but whether these will be met by expansion in local production or imported feed is uncertain. The feed market for the black tiger shrimp will be worse in 2009 in the Philippines. Vietnam feed millers will expand production for the vannamei shrimp. In all countries, the future will be in extruded fish feeds, be it for the freshwater or marine fish.

References are available on request

Industry Forum

Insight into the aqua feed business in China

By Ming Hsun Wu

The current aquafeed production is only 41% of total demand and industry faces low margins, lack of know-how and feed safety issues.

This half-day industry session held on 23 September 2008 was part of the 7th Symposium of World's Chinese Scientists on Nutrition and Feeding of Finfish and Shellfish (SWCSNFFS). The theme of this session was 'Aquafeed Enterprises Technology Innovation'. It was hosted by Dr. Kang-Sen Mai. Industry representatives came from the New Hope Group, Haid, Evergreen Group, Tongwei Co.,Ltd and other leading aqua feed producers in China.

In China, similar to elsewhere, feed is the key factor followed by good seedstock and water quality in determining growth performance of fish and shrimp. It accounts for at least 70% of production cost. However, we have faced increasing challenges during recent years, particular in aqua feeds production, according to Dr. Mai.

Meeting demand

Aquafeed production in China in 2007 was 13.26 million tonnes showing a growth of 17.7 times as compared to volumes in 1991 (750,000 tonnes). Currently, the total aquafeed demand for all farmed fish production is 32.3 million tonnes, but the production data in China shows a supply of only 13.3 million tonnes. This implies there is a market gap of 19 million tonnes in China. The current aquafeed production is only 41% of total demand.

Not only raw material prices

The problems in China are not only soaring prices of raw materials but also lack of know-how, serious feed safety issues and the lack of a proper business model. As for cost, the feed company can hardly convert the raw materials cost to feed with a margin. Therefore, the overall profitability in aqua feed production in the past three year has decreased significantly and apparently will reach a historical low in 2008. Research should also focus on availability of raw materials such as nutrient availaibility, amino acid balance, palatability, unknown growth factors and interaction between nutrients. The common problems of the aqua feed business model in China are bad debts and long term credit, said Dr Mai in his presentation.

Plastic covered ponds for the culture of the freshwater prawn in Guangdong Province.

Mr. Sung Kuang Wen, General Manager of Zhongshan Uni-President, China delivered the welcome speech before the banquet.

Innovative development is becoming increasingly important. The lack of demand from customers should provide a clue that they are unsure of their direction. Innovative companies could propose direction and solutions which go beyond the expectation of the clients. General market investigation is not enough and we should engage with the customer and brainstorm to find out their needs. In addition, we should help them optimize their business and good use of their assets, said Gan Zhi-lim, Kemin China.

Uni-President Group, as corporate sponsor, hosted a large scale banquet at the closing ceremony. Mr. Sung Kuang Wen, General Manager of Zhongshan Uni-President, China introduced Uni-President which was founded in Taiwan in 1968. The company started with wheat flour, animal feed and aqua feed businesses. Today it has expanded to a variety of areas including food, pharmaceutical, retail, distribution, finance, shopping malls, entertainment, health clubs and resorts. Group revenue of Uni-President Group was USD 9.5 billion in 2007. In China, there are four Uni-President aqua feed mills, located in Guangdong, Sichuan and Shangdong provinces and Shanghai. The aqua feed products includes feeds for the eel, marine fish, tilapia, carps, white shrimp, crab and ornamental fish to meet local requirements.

Ming Hsun Wu is currently Director, Aquatic R&D Division, Uni-President Vietnam Co.,Ltd.
E-mail:mhwu@upvn.com.vn

14th Aquaculture Conference Asia Pacific

Within an environment of uncertainty, an analysis of the global commodity markets provides an insight into possible impacts. The fish meal and fish oil situation, evaluation strategies for common and under utilised raw materials and improving cost effectiveness of shrimp feeds were also discussed.

The concern at this annual meeting for the aqua feed industry in Asia was the sudden rise in feed ingredient prices against a backdrop of historically low farm gate prices. This is now overshadowed by the current global financial crisis. Dr Jacques Gabaudan, said, "Aquaculture and other animal feed production industries have been deeply affected. Our contribution this year is to show how the current mood impacts the commodities market for feed ingredients. We will also help industry how to select, make the most of raw materials and improve on nutritive value of certain ingredients."

The Aquaculture Centre Asia Pacific, DSM Nutritional Products invited a selection of feed and nutrition experts to impart information on global issues in the commodity markets and share their ideas on assessing raw material quality, pre-processing ingredients to increase nutritive value of ingredients and use some underutilised raw materials available locally. On 20th November, 2008 in Bangkok, invited participants also learnt how the evolution in feed management led to low production costs in the salmon industry in Norway, how to optimise feed formulations and reduce production costs for the vannamei shrimp.

Global commodity market

The current economic environment is in turmoil and faces a completely new environment of uncertainty, said **Jean Francois Mittaine**, Associate Professor, International Trade, CNAM, Paris University, France and Director, Market & Trade Issues, IFFO. A sharp decline in world trade is expected in 2009/2010 as the IMF has shown declines in consumer confidence in both the USA and EU leading to a slow growth in domestic demand.

The commodity markets are affected by several factors: oil prices, recession, concerns with demand from key players (China and India), bio-fuels production and "commodity funds" that have played a key role in the price rally witnessed in the first half of 2008. The commodity markets have witnessed a sharp correction since July/August 2008 and have moved from "bull" to "bear" and, on a happier note, good for the feed industry, with lower prices. Soya bean meal and oil prices are the lowest in more than 4 years. Corn prices are lower than 2007 and wheat prices are now USD 4.8/bushel as compared to more than USD 12/bushel a year ago.

"With the current price of petroleum being a third of its price four months ago, could it be cause for optimism and will the real economy benefit as world economic growth is being reduced to 7.7% for Asia in general and 9.3% in China and 6.9% in India? Growth estimates are declining week by week as sharp declines in consumer confidence are occurring. What will happen next, I cannot tell but out there, we will surely see impacts", asked Jean Francois.

"We are now in the middle of divergent trends. The demand for bio-fuels which took a large share of corn/vegetable oil supplies has declined due to lower petroleum prices and, at the same time, we witness large ethanol processing capacity in the US. The problem of world markets in the grains and oils seeds is their respective demand/supply situations. We have to keep in mind that for corn, wheat and soybean meal, we are still on very low final stock levels. We also know that China continues to be a major player but, at the same time, the pending recession could very well play an even larger role".

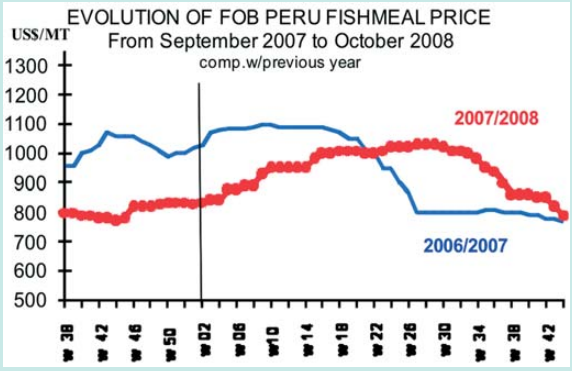
From left, Jacques Gabaudan, Jean-Francois Mittaine and Brett Glencross.

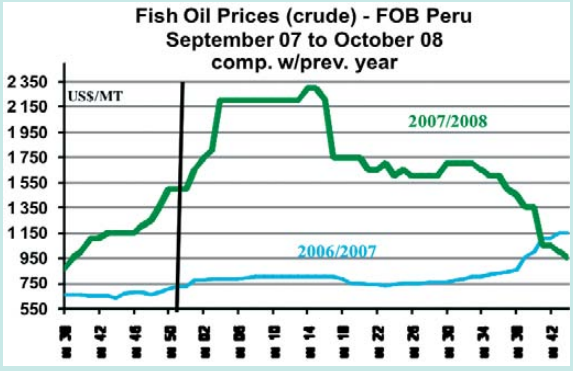
From left, Yohannes Irianto (DSM), Nessy Liu (PT Menjanean Sakti), Ir Candra Yanuarti (PT Sinta Feed Mill), Melinda Jonas (PT Medion) and Ery Soedewo (PT CP Prima).

"Because of the return to sharply lower grain/oilseeds prices, it is not sure whether demand is weakening. Then there is a strong recovery of the US dollar versus some key currencies like the Euro (but also the Peruvian sol and the Chilean peso) but weaker against the Japanese Yen and Chinese Yuan. Finally, remember that freight rates have been litterally "sinking" as reflected by the Baltic Index downward trend from an index of around 12000 in May/June 2008 down to less that 1000 early November. One way or the other this important factor will impact on all commodity markets."

The key drivers for the fishmeal and fish oil markets in 2008

Within the highly speculative environment governed by the "funds" as witnessed during most of the year 2008, fish meal prices have remained relatively stable because, in this market, all transactions are cash in a physical market. There are no future markets. In 2007-2008, prices



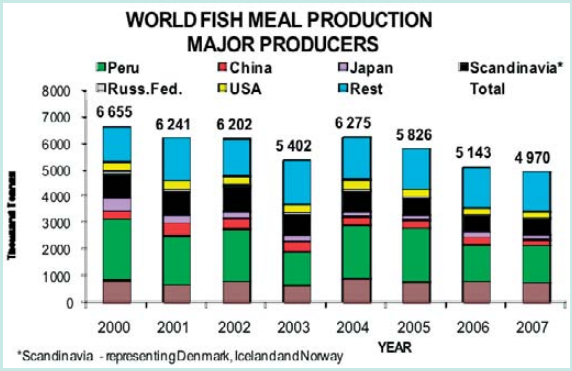


ranged between USD770/tonne to USD1100/tonne. The link between fishmeal and commodity prices is the fishmeal/soybean meal price ratio. The average ratio has remained between 2.0 and 3.0 since 2007, which is considered competitive, said Jean Francois Mittaine.

"Fish oil prices rose sharply late 2007/early 2008 due to high rapeseed oil prices combined with omega-3 demand. However, they declined sharply recently and are now back to year before level. In this case, the dominant factor is the link with rapeseed oil, a key substitute in aqua feed rations for salmonids. It is usually between 1.0/1.2 (fish oil/rapeseed oil). Since 2007, the fish oil market also moved from a by-product of fishing and processing to a "core nutritional product" (a main source of highly unsaturated omega 3 fatty acids (HUFAs)."

Supply side

Generally supply is relatively stable as fishing is fully controlled by quotas. Total global production of fishmeal is estimated around 5.0

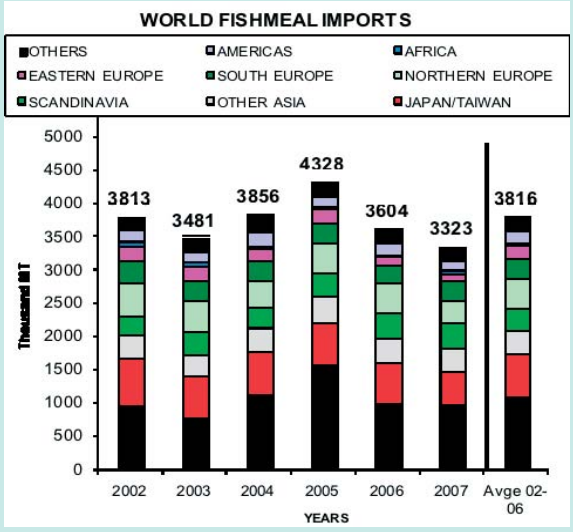


million tonnes annually and IFFO members contribute 65% to this production.

Fishmeal is produced all over the world but the key players are located in less than ten major countries where production is based on modern land based plants, most of them with steam-dried equipment and many of them operating with HACCP and/or ISO production schemes. Peru is the largest producer with about 140 plants. Chile, Scandinavia, the UK, Ireland and Faroe Islands, South Africa and the USA are also major producers.

Production of non-IFFO members was less than 2 million tonnes in 2007. The largest producer was Thailand with more than 100 plants. Another significant producer is Morocco with about 24 plants. In Africa, small plants are scattered along the West coast in Africa. New modern plants are being built in India and even in China.

Fishing is a controlled industry which limits the overall supply. In the case of fish oil, there has been an overall stability of world production around 1 million tonnes.



Demand side

According to estimates made by IFFO in 2007, aqua feed production uses about 65% of the supply. Some 83% of fish oil is used in aquaculture, mainly for the salmon industry and 17% for "other usage" of which a small but highly priced omega-3 usage.

The bearish factors to consider on the demand side are uncertainties with world recession, fish meal inventories in China and declining grains and oilseeds prices.

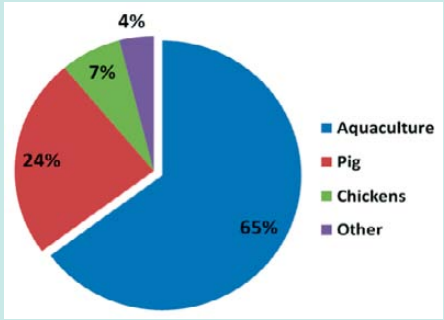
"Nevertheless, demand for aqua feeds will continue. Aquaculture is the only food production which is rising overall in most countries.

Philippines participants, from left: Albert Elman, Marcela Farms, Nicanor M Cual, Universal Scope Philippines, Inc. and Moises John C. Reyes, DSM Philippines

From left, Dr Chen Ming Dang, CPF Thailand, Anys Lee, Nice Garden, Taiwan and Hsichia Wu, Siamakme, Thailand

Carnivorous fish are key fishmeal consumers and will continue to do so and so will shrimp. Shrimp is widely consumed in restaurants. I am not sure that it will go down in a recession. It is the last festive item. Countrywise, China will remain the number one world fishmeal consumer and its current stocks are fast depleting," said Jean Francois.

Fishmeal usage by sector – 2007 (est)



"Aside from aqua feed production, Chinese market analysts expect that demand for fishmeal will continue to be high on account of high pork usage. Actually, fishmeal consumption at this time of the year (November) is unusually high on account of this strong demand from pork."

Outlook 2009

In summary, it is expected that supply/demand fundamentals will remain rather stable in the coming months over 2009, similar to 2008. The price competitiveness of fishmeal both on world markets and in the Chinese market remains good in spite of the very sharp price correction witnessed on the soybean meal market. The fishmeal/soybean meal ratio recently rose to about 3.0, far below the levels witnessed two or three years ago. Fish oil has also returned to the historically usual price ratio with 1.0/1.2 (fish oil/rapeseed oil) range. Lower petroleum prices should improve production costs of both fish meal and fish oil.

Some important key factors are that fishing restrictions do limit production and consequently producers have to allocate their production to the highest possible market sector. As producers have invested in quality schemes to ensure the best possible quality, they will also look for "niche" markets.

Title:"Global analysis of the commodity market - emphasis on fishmeal and fish oil".

Dr Ole Torrisen with Dr Supis Thongrod, Thai Union Feed Mill (second right), Rungthip Burapharat, Centaco Food Products Co., Ltd (left) and Orapin Sukpiriyagul, Betagro Agro-Group Public Co., Ltd (right), Thailand

Prof Wutiporn Promkunthong, Prince of Songkhla University and Dr Oraporn Meunpol, Chulangkorn University, Thailand.

A feed is only as good as its ingredients

By Dr Brett Glencross, Aquaculture Feed Grains Program, Department of Fisheries, Australia.

The evaluation of feeding ingredients usually precedes any formulation of diets according to specifications. A dependence on one ingredient is a risk because of issues in supply, price volatility, contaminants and nutritional value variability. However, the risk in using alternatives is in the introduction of additional variables such as different contaminants, anti-nutritional factors (ANFs) and different complexities in the nutritional variability of the alternatives. The awareness is on how to maximise the value of a raw material.

"Every diet must be able to perform to the expected level. In making the diet it is not only about having the required nutritional specifications but also the technical and functional attributes".

This presentation covered a review of ingredient evaluation strategies for aquaculture based on more than 10 years of nutritional research. The initial step of characterisation requires mandatory information on species, origin and age from harvest time and processing, which should be available from any reputable raw material supplier. An example given was that genotype affects the crude nutritional parameters of the product as in the case of dehulled lupin (kernel) *Lupinus angustifolius* cultivars where the crude protein ranged from 360 to 450 g/kg, although all samples were produced in same year and from the same site.

The various steps in assessing nutritional effects should follow. Methodologies for feed intake, digestibility and growth are diverse but what is important, is that the chosen method matches the hypothesis of the test. Researchers should be aware of the positive and negative aspects of each methodology. An example is in digestibility where faecal collection by settlement can give higher values and that raw material processing method affects digestibility. Digestibility complexity among lupin varieties is relatively well understood and shown to be a function of the polysaccharide content and specifically the lignin content that influences protein digestibility. Feed intake defines effects of ingredients on palatability and thus "Irrespective of the nutrient composition or how digestible an ingredient is, if an animal does not eat, its value is diminished".

Among the ways to assess growth and utilisation, researchers must see the advantage of each method. There is actually no right or wrong method. For example, satietal feeding can mask nutritional variability whereas protein limited restrictive feeding show the effects of minor changes of nutritionally sensitive ingredients such as amino acid changes between GMO and non-GMO grains.

There is also the option for the introduction of other elements which can add value to the process. These include organoleptic tests, in-vitro assessments, nutrigenomics, nutriproteomics, and ingredient proteomics, near infra-red spectroscopy to look at both crude and digestible characteristics and intestinal pathology for health assessment.

"In the future, the need will be to use variety of ingredients with confidence and flexibility. We will also need to accommodate a broader range of biological and physical effects that different ingredients introduce into a diet. We will need to be mindful of the limitations of different ingredients introduced and see the broader range of biological and physical effects that different ingredients may introduce into a diet".

Title: A feed is only as good as its ingredients –A review of ingredient evaluation strategies for aquaculture feeds. Original article was published as: Glencross, B.D., Booth, M. and Allan, G.L. 2007. A feed is only as good as its ingredients – A review of ingredient evaluation for aquaculture feeds. Aquaculture Nutrition 13, 17 – 34.

Common and underutilized feed ingredients in Asia Pacific

Dr Uthai Kanto, Department of Animal Science, Faculty of Agriculture, Kasetsart University, said that these can be used as alternatives as long as they are highly digestible with low crude fibre containing no toxins, anti nutritional substances and no unpleasant taste and rancidity. Feed utilisation can be improved with enzyme supplementation. Cassava (*Manihot esculenta*) has a high starch, low protein content (2%) and high crude fibre (4%) and the hydrocyanic acid (HCN) in cassava can be reduced by processing roots into dried cassava chips by sun drying for 3-4 days. This reduces HCN from 100ppm in fresh roots to 30ppm in dried cassava and further storage reduces this to 10ppm which is even less toxic to fish. The other advantage of cassava is the fast digestibility of the soft-starch (mainly amylopectin) and cost of THB 4.5/kg versus THB 9/kg for corn. High weight gain and survival was shown when hybrid catfish was fed diets containing 26% cassava meal, substituting 100% for corn (Jintasataporn, 2000). The recommended level is 30-35% of the diet for fish. Cassava pulp, by product of cassava starch production containing 2% protein, 50% starch and 12-15% crude fibre can be included in diets at 15-20% inclusion rate. Cassava leaf meal which has 18-30% protein can be included only at 5-8% in diet because of the high fibre content. Palm kernel meal with 16-18% crude protein showed low protein and amino acids digestibility and low palatability. Mugbean meal, by product from the mugbean noodle has 14% crude protein and 15% crude fibre. Mugbean gluten has 70-80% protein and less than 1% crude fibre but is limited in supply.

Pre-processing ingredients to increase nutritive and economic value for aquaculture feeds

This described work in the US to increase options for feed formulators during times of volatile ingredient prices. The objective of the Plant Products in Aquafeed group is to effectively use available technologies to develop highly digestible, sustainable and economic alternative diets for fish meal, said **Dr Frederic T. Barrows**, U.S. Department of Agriculture, Agricultural Research Service, Hagerman, Idaho USA.

Using three modification methods, the group has shown results such as with air classification, the protein content in rice can increase from 13-14% to 70-80% and protein digestibility from 77.2 to 88.3%. As the solvents used to produce soy protein concentrate or wheat gluten meal is expensive, the alternative is to use less toxic solvents. The future will also see 63% protein soybean of aqua feed grade produced using a non-flammable alternate chemical modification. Further details are in the review paper entitle "Expanding the Utilisation of Sustainable Plant Products in Aquafeeds" (Gatlin et al., 2007) and The Aquafeed Working Group Strategic Plan (Barrows et al., 2008) are available at www.aquafeed.com.

Feed ingredient situation: Challenges and solutions for the salmon industry

Dr Ole J. Torrissen, Institute of Marine Research, Bergen, Norway said that currently, the industry is characterised by high volumes and low price, a high level of automation, large sea cages of up to 70,000 m^3 and enforced governmental regulations on feed, environment, diseases and animal welfare. It is highly focussed on production cost. The key factors are fast turnover which requires high growth and short production cycle, low mortalities and low feed costs. The production cost came down from USD 12 /kg to USD 3/kg, due to lower cost for labour and juveniles and higher harvest volumes. The relative feed costs (kg of salmon harvested) have changed from USD3.50 to less than USD 1.50/kg. Extrusion has produced feeds to contain up to 30% lipids. When feed quotas were implemented, producers increased lipid level in diets. FCR improved to just above 1.

Improving the cost effectiveness of shrimp feeds

According to **Dr D. Allen Davis**, Department of Fisheries and Allied Aquacultures Auburn University, there are many aspects of cost reduction that revolve around nutrition. In farming the vannamei shrimp, the feed must be cost efficient and the producer should be able to factor in the nutritional contribution of the natural productivity. This can contribute 40-60% of the carbon. It may also vary with the time of year, site and management. Previously, this has been disregarded as the producer could afford to be wasteful. Now reducing costs is critical.

"The diet is worthless unless properly applied. It must be matched to the nutrient inputs with physiological requirements for growth. To obtain maximum returns on feed investments the feed must be properly applied, nutritious and cost effective."

Allen showed how feed inputs can be managed to take advantage of the use of natural productivity and improve FCR from 2 to nearly 1 in a pond with a stocking density of 35 PL/m^2. He also discussed the ingredients in feed and making the most of its nutritive value.

Fish meal and fish oil constitute key ingredients within the value chain

Fish meal and fish oil can be produced from both wild fish caught and processed fresh or from trimmings coming from the processing for human consumption (canning, freezing, filleting). Both bring not only an economic value but also an environmentally friendly product. Fishmeal processed from trimmings contributeto a very sound recycling process while at the same time providing a high value by-product.

IFFO is in the process of setting up a new Code of Responsible Practice for the production of fishmeal and fish oil in 2009. This is a B2B responsible practice scheme. The objective is to demonstrate that fishmeal produced from IFFO member plants is from high quality marine resource extracted under responsible practices. It is required by the value chain to ensure that fish meal is originating from a sustainable resource. CORP is based on two pillars. The first, "Purity/Safety", under which products will reflect standards of modern, professional industry in the food sector and meet buyer's expectations. The second is "Sourcing" which complies with FAO's "Code of Responsible Fishing" as well as other codes of responsible fishing.

Health & nutrition developments in the rearing of marine fish larvae

By John S. Clark and Arjen Roem

Changes in ideas and product utilisation can yield significant survival and growth benefits for fish larvae. Combining nutritional and health strategies in rotifers and Artemia nauplii enhanced fish larvae growth in trials in Thailand.

Artemia enriched for 4 hours with new enrichment.

Rotifers enriched for 2 hours with new enrichment

Thailand has long been regarded as the pioneer in the rearing of larval marine fish in the South East Asian region, particularly with the sea bass, *Lates calcarifer*. Artificial propagation was successfully demonstrated by Wongsomnuk and Maneewongsa (1972). Since then, the industry has grown in Thailand with many hatcheries scattered along its eastern seaboard, particularly in Chachoengsao, Chonburi and Rayong. Current production estimates are around 800 million 1-inch (2.5cm) fry/year, many of which are exported to Malaysia, Taiwan and more recently Vietnam for further grow out in cages and ponds.

In general, hatchery survivals are fairly low when compared to those of their European counterparts. Hatcheries tend to be smaller and are less capital intensive, with labour being mainly non-technical. General hatchery standards of hygiene tend to be lower and the level of technical expertise with respect to larval nutrition and health is sparse. However, despite rampant low overall survival rates, the industry is still a highly profitable one. In common with so many other aquaculture sectors, small changes in routine and product utilization can yield significant differences in survival and growth benefits.

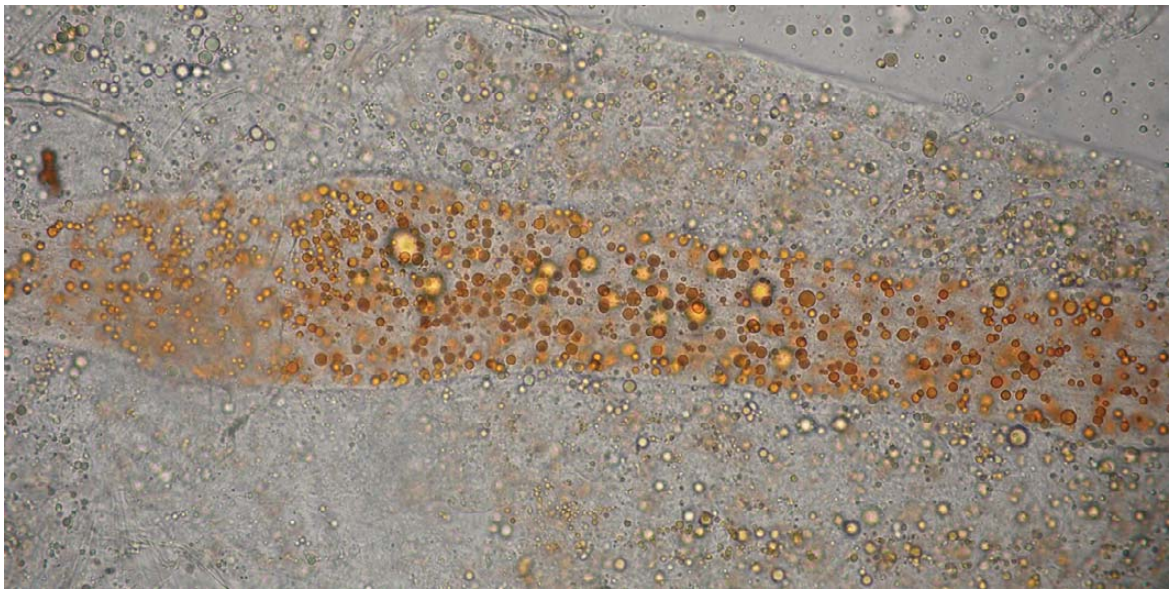
Manipulation of health and nutrition

The simplest area to manipulate and improve upon in terms of fish larval health and nutrition is in the field of bio-encapsulation using first rotifers then Artemia nauplii.

Traditional enrichment methods involve concentration of the living food organism in a suspension of nutrients such as essential fatty acids(EFAs) and/or vitamins. As these two food organisms are filter feeders, they concentrate these nutrients within their tissues. After harvesting, they are fed to fish larvae which benefit from the enhanced nutrient profiles.

There are, however, disadvantages clearly associated with this process. In the case or rotifers exposed to 12 hour enrichment at recommended dosages, high rotifer mortalities are commonplace. Reducing product density reduces product uptake by the target animal and only reduces rotifer mortality rate. This mortality is clearly seen as an accumulation of foam on the surface of the enrichment vessel. Furthermore, microscopic examination of the rotifers after 12 hour enrichment reveals the rotifers to be very sluggish in their rates of movement compared to non enriched rotifers and this may well result in further rotifer mortality in the fish larval rearing tanks.

In the case of *Artemia*, the disadvantages may well be considered greater. With 12 hour enrichment times from Instar 2, the nauplius grows rapidly and may well become too large and fast moving for the intended predator fish. Again, there can be naupliar mortality in the enrichment vessel and a concomitant increase in the risk of disease transmission from dead or dying nauplii.



Whole artemia gut showing health products in a micro-encapsulated form droplets in tissues and gut (Photo 1).

With new enrichment techniques optimising filter feeding particle uptake, the time element can be reduced to a mere 1-2 hours. This leads to reduced labour inputs and easier scheduling of hatching and feeding operations. The nutritional quality of the prey organism is extremely high. In the case of rotifers there is no significant mortality in the enrichment vessel and the prey organism mobility remains high and in the case of nauplius, growth is limited, therefore the nauplius remains small. Fish larvae therefore find it much easier to capture smaller prey moving within their reactive perceptive fields (RPF) of vision. The risk of contamination is considerably reduced in such a practice.

In summary the short time enrichment process is less work for the hatchery operator and increases nutritional quality for the fish larvae.

What should be used as enrichment materials?

Traditionally this has been heavily skewed in favour of EFAs and vitamins. It is now possible to manipulate individual EFAs depending on the requirement of particular species or particular life stages of a species. As examples, some cultured organisms require EPA whilst others require higher levels of docosahexanenoic acid (DHA) or arachidonic acid (ARA); these can all be controlled and manipulated for the benefit of the target fish/shrimp. Short term enrichment can, however, be applied to a much wider spectrum of nutrients such as proteins and minerals..

In terms of health, it has always been accepted that vaccination is out of the question, although recent work by Shoemaker and Klesius (2005) has shown that immune cells do exist and function in catfish fry as young as 10 days old. There are lessons to be learnt from studying immunity in higher vertebrates and extrapolating these to fish larvae. One such area is passive immunity. It is possible to prepare micro-encapsulated suspensions of natural immune products and concentrate them in rotifers and Artemia nauplii. Such products have been shown to significantly enhance larval fish survival in recent trials in Thailand, Malaysia and Vietnam. In the critical early days of larval development, these tools will be of great benefit in the future.

Quality artificial feeds

As in other situations, cheap does not often mean good. To rear the best quality fry one must use high quality feeds. What looks good to the operator e.g. in terms of colour, may not mean anything to the fish, which most likely sees in shades of grey. By the same token, what feed smells good to the operator may not smell good to the fish. Acceptability and palatability go hand in hand but may not necessarily be enhanced by the same compounds. A good illustration of this was observed in a large sea bass hatchery in Thailand. Fish had been weaned onto one commercial feed and then were offered Skretting Gemma feed as an alternative. There were no problems in acceptability or palatability. The same could not be said vice versa.

Combining health and nutrition strategies

Recently trials were run in Thailand rearing larval sea bass from first feeding on a combined health and nutrition strategy developed by the

Figure 1. Mean body weight (mg) of sea bass larvae.

Figure 2. Mean body depth (mm) of sea bass larvae.

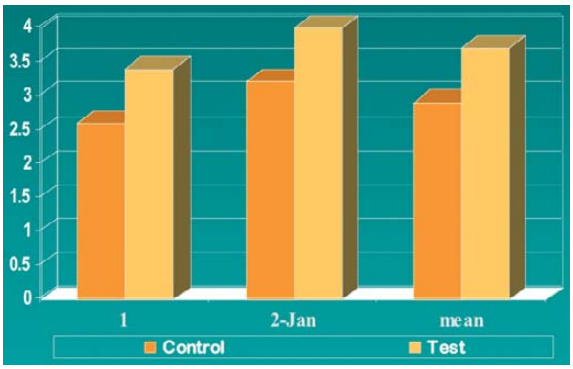
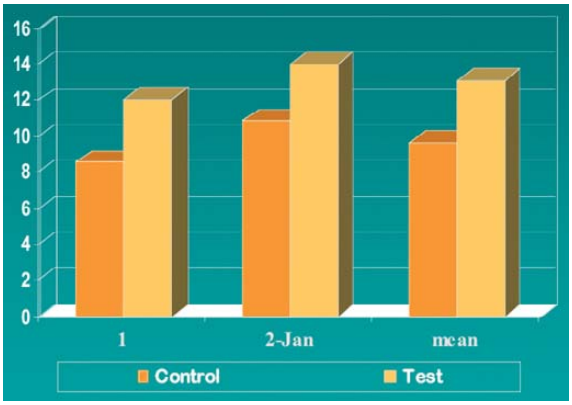


Figure 3. Mean body length (mm) of sea bass larvae.



respective companies of the authors. The chosen hatchery was Talaythai hatchery in Ang Sila, Chonburi and involved four million hatch fry.

Monitoring of the trial was done by representatives of both companies and by a team of aquatic veterinarians under the direction of Associate Professor Nantarika Chansue of the Aquatic Veterinary Medicine Department of Chulalongkorn University.

Both rotifers and Artemia nauplii were enhanced nutritionally and boosted with a variety of natural health components in a micro-encapsulated form (Photo 1) This test was conducted against a conventional enrichment process. This process was implemented for a 20 day period following initiation of first feeding. Stocking densities were 40 larvae/litre and rotifer density was maintained initially at 20/ml. Feeding of enriched Artemia nauplii was initiated at Day 12 with an initial density of 1/ml. Daily feeding began with twice a day and by Day 14 it was increased to 7 times/day, beginning at 6am every 2 hours until 6 pm. Weaning using a conventional feed against a Skretting Gemma feed regime was initiated at Day 15 until the end of the test.

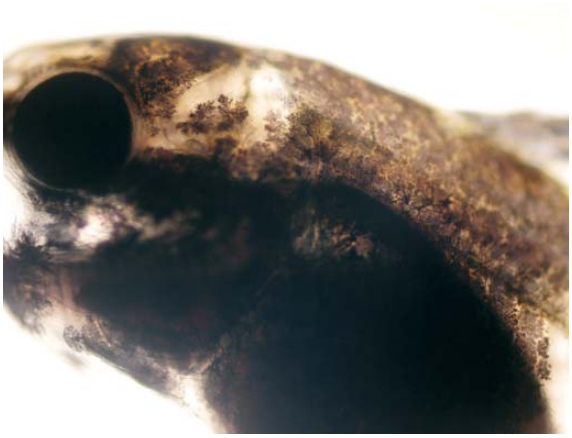
Results showed a large difference in survival (80% against 30%) which is almost certainly due in the first instance to the natural enhancement of the larval immune system. No antibiotics or probiotics were used in the course of this trial, therefore their influence could be negated. The influence of improved quality feed became increasingly evident as the trial progressed, and therefore feed built on the advantage provided by improved health.

Animal size in the test group was considerably bigger (Figure 1). This was observed as early as Day 2 by Prof. Chansue and her team. The team noted the larvae were longer and deeper bodied (Figure 2-3), and that cranial diameter was larger in test fish (Photo 2). Of most interest to the team were the obvious differences in dentition in the 2 groups of early larvae, with test larval dentition being more advanced than in controls (Photos 3). The more advanced animals in the treated group exhibited longer teeth which had completely pushed through the gingival tissue when compared to their lesser developed control counterparts. This observation is part of a more detailed study conducted by Prof. Chansue and her team on the dental development in larval sea bass.

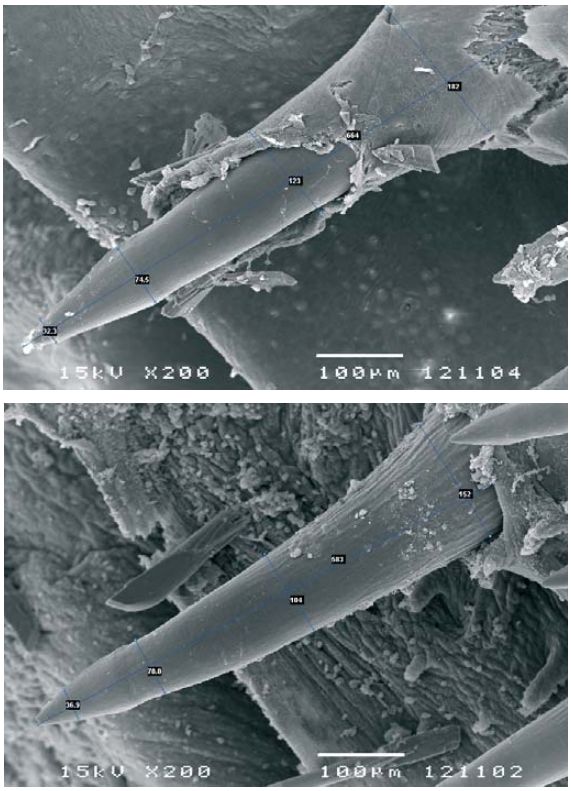
Species Expansion

Since carrying out this initial trial, two repeat trials have been conducted at the same hatchery with similar results. In more recent trials with red snapper and tiger grouper in Malaysia the same system has been shown to produce excellent survival and growth in the test larvae. The same is true for larvae of the cobia and orange spotted grouper reared in trials in Vietnam.

The overall intention is for the two companies to apply this joint health and nutrition package to hatcheries in every country throughout the region. A similar program for shrimp larvae is in the pipeline.



Cranial diameter was larger in test fish fed natural health components in a micro-encapsulated form (left) as compared to control fish (right) fed via a conventional enrichment process (Photo 2).



Advanced dentition in test group (below) as compared to control group (above) (Photo 3).

Acknowledgements

The authors would like to thank M. Kaew and P. Saeng of Talaythai hatchery for the use of their facilities. Thanks are also due to the many supporting staff of both Bayer Animal Healthcare and Skretting for their support during the trial, and to Prof. Chansue and her team from Veterinary Medical Aquatic Research Center, Veterinary Medicine Department, Chulalongkorn University.

References are available on request from the authors.

John S. Clark obtained his Ph.D. in micro-encapsulation at Heriot-Watt University in Edinburgh, Scotland in 1983. He has consulted with established pharmaceutical companies such as Roche and Pfizer Food Science and currently is engaged by Bayer HealthCare - Animal Health in the field of anti-parasitic treatments for aquatic organisms. Email: aquavax2003@yahoo.co.uk

Arjen Roem, PhD has more than 20 years worldwide experience in practical fish nutrition. Currently, he is working as product development manager for Skretting Asia fish feed activities. Email: arjen.roem@skretting.com

Marine shrimp in Asia: Production trends

Kuruma shrimp at the wholesale market in Guangdong sold at RMB100/500g (USD16)

Estimates on marine shrimp production in Asia totalled 2.37 million tonnes in 2008. Vannamei shrimp production is almost 99% in Thailand. The lower value of shrimp despite an overall higher cost of production, especially for the monodon shrimp, dampens the industry. AAP reports.

This data was collected from presentations at the Global Shrimp Technical and Trade conference held in Guangzhou from 6-9 November 2008, regional meetings and additional inputs from industry. Official figures for production in 2006 gave a global production of 3.07 million tonnes (Fish Stat Plus, 2007) and Asian production of 2.74 million tonnes. An estimate for 2007 totalled 2.37 million tonnes for production in Asia (AAP, 2008). Adverse weather, typhoons, cyclones, floods, heavy rains in the Philippines, Vietnam, India and Thailand disrupted culture and delayed stocking. Production was also affected by diseases, low farm gate prices and shortage of quality post larvae.

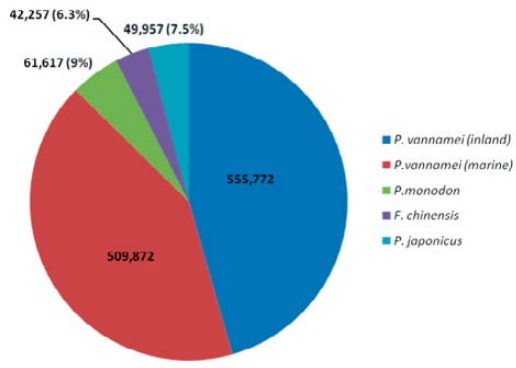
China

China's production of the penaeid shrimp totalled 1.21 million tonnes in 2007 (Infoyu, 2008). A lower production in China was predicted in 2008 because of bad weather. In 2007, *Penaeus vannamei* accounted for 82% of the total production. The culture of the kuruma shrimp *P. japonicus* is expanding in Shandong. This high value species is becoming popular in South China where three crops can be obtained.

Thailand

The estimate given by industry for 2008 was 490,000 tonnes of vannamei shrimp and 5,000 tonnes monodon shrimp. Vannamei shrimp production is expected to decrease in 2009 to 480,000 tonnes, said Dr Chen Ming Dang, CPF in Bangkok. The production in 2007 was recorded as 441,451 tonnes of vannamei shrimp with less than 1% of monodon shrimp (3,301 tonnes), said **Krissana Sukhumpanich**, Department of Fisheries Thailand. In 2009, industry associations have asked for a cut back in production by 10-20% (see news page 6). In 2009, the expectation is that monodon shrimp production will decline further to 1,500 tonnes, despite calls to bring back production to at least 5% of the total marine shrimp production.

Figure 1. Production of marine shrimp by species in China in 2007 (Infoyu, 2008).



Indonesia

Official data showed that production in Indonesia was 352,200 tonnes in 2007 (**Reza Shah Pahlevi**, Directorate of Aquaculture) and an estimate

of 350,000 tonnes in 2008, according to the Indonesian Shrimp Commission. A significant portion came from CP Prima, Indonesia's largest shrimp integrated company which produced 58,108 tonnes of shrimp in 2007. This increased by 43.52% to 86,174 tonnes in 2008 (Sinar Harapan). However, industry has indicated a production of only 276,000 tonnes, comprising of 237,000 tonnes of vannamei from CP Prima, intensive culture (110,000 tonnes), semi and extensive culture (40,000 tonnes) and 30,000 tonnes of the monodon shrimp. The target set by government was 470,000 tonnes for 2008. In 2009, output from CP Prima will increase as the revitalization of the 14,137 core-plasma ponds is completed and by 2010, a production of 92,000 tonnes is expected. The volume of monodon shrimp will decline to 20,000 tonnes. The country wide target for 2009 is 510,000 tonnes, mainly through the revitalization program of old ponds with investments of USD 100 million.

Vietnam

The extension of culture of the vannamei shrimp to the Mekong Delta has led to 100,000 tonnes of vannamei shrimp, accounting for 30% of total production of 320,000 tonnes in 2008. In 2009, this is expected to increase to 40% at the expense of areas used for the monodon shrimp culture. The push for vannamei shrimp farming is also due to the availability of quality post larvae which most top hatcheries (mostly run by feed companies and large integrated operations) produce from SPF brood stock imported from the US and Thailand. These post larvae can reach 60-70 pcs/kg in 90-100 days (1.3g/week). Locally raised high health post larvae of the monodon shrimp is available but at a high cost.

Philippines

Production in 2007 was 42,665 tonnes, mainly of the monodon shrimp. Some 4,000 tonnes of vannamei shrimp were harvested in 2007 and 80% came from Luzon Island, said **Wilfredo Yap**, Aquaculture Consultant. Stocking density varies from 50 to 100PL/m^2 producing 10 tonnes/ha in Luzon to 3 PL/m^2 producing 400 kg/ha with no aeration. In 2008, the estimate production is 44,000 tonnes and less of the monodon shrimp.

Malaysia

The official production in 2007 was only 37,650 tonnes according to **Ismail Abu Hasan**, Department of Fisheries but industry gave production estimates of 70,000 in 2007 rising to 80,000 tonnes in 2008. Production could comprise 90% of vannamei shrimp, despite the supply of high health post larvae of monodon shrimp. The self imposed ban on exports to the EU in mid 2008, would have affected production. The target under the development strategy is to produce 180,000 tonnes by 2020 and to achieve this, the government is aggressively pursuing the development of some 30,000ha by funding infrastructure linked with several incentive schemes under its high impact aquaculture schemes.

Bangladesh

Mahmudul Karim, Bangladesh Shrimp and Fish Foundation (BSFF) said that Bangladesh is only interested in farming monodon shrimp. Production was around 60,000 tonnes in 2007. Production estimates for 2008 are not available but it would have been affected by cyclones in late 2007. The potential for increasing production is possible with sufficient hatcheries and only 25% of processing facilities is utilized.

India

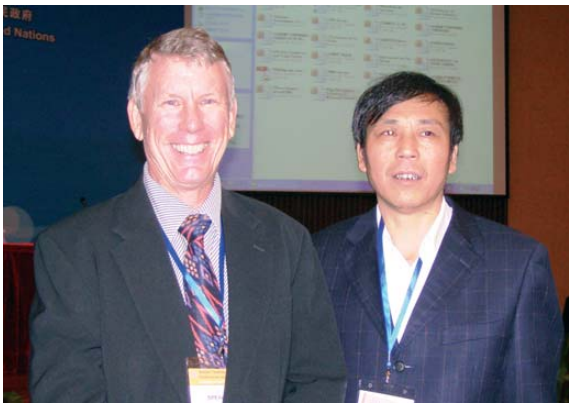
Thampi Samraj, MPEDA said that the production was 144,347 tonnes of monodon shrimp in 2006-2007 and consequently this declined 38% to 106,160 tonnes for the 2007-2008 period. The latter reflected problems in India in the culture of the monodon shrimp ranging from recurring disease outbreaks, low farm gate prices, increasing costs of production and rising quality requirements. The production in 2008-2009 is expected to be stagnant at 100,000 tonnes and in 2009, industry expects 6,000 tonnes of vannamei shrimp in India as the ban on its culture was removed in October 2008.

Transition to vannamei shrimp

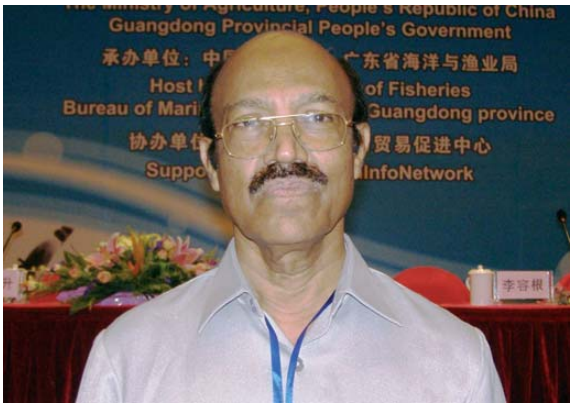
The vannamei shrimp is leading production because of its biological traits, feeding behaviour and economics, said **Jim Wyban**, High Health Aquaculture Hawaii. Vannamei post larvae (USD 1.50/1000 PL to USD 4/1000 PL, depending on countries) is cheaper than that for the monodon PL (USD 2.50/1000 to USD 15/1000 for SPF post larvae). The cost of SPF vannamei broodstock is USD 30 each versus possibly USD 150 to 300 each for monodon. Vannamei's growth pattern is steady at 20g in 100 days (SPF post larvae) versus monodon shrimp at 25g in 125 days. Nocturnal and active feeding patterns in the vannamei shrimp allows for a much higher stocking density which averages 80 to 175 PL/m^2 in contrast to 5-25 PL/m^2 for the monodon shrimp. All these make it difficult for any farmer to resist culturing the vannamei shrimp. In Vietnam, the short growth period of the vannamei shrimp has allowed for better utilisation of ponds with vannamei shrimp culture followed by the seabass. In Asia, producers are also culturing with success large vannamei shrimp which will put further pressure on the monodon shrimp.

Professor Wang Qingyin, Yellow Sea Fisheries Research Institute, Qingdao (middle right) , Fatimah Ferdouse, Infofish (middle, left) and Chinese participants, at the Global Technical and Trade conference, Guangzhou, 6-7 November 2008.

From Left, Itamar Rocha, President, ABCC, Brazil, Ismail Abu Hasan, Department of Fisheries, Malaysia, Reza Shah Pahlevi, Directorate of Aquaculture Indonesia and Tarlochan Singh, Infofish.



Jim Wyban (left) and Chinese participant



Mahmudul Karim, Bangladesh Shrimp and Fish Foundation

Figure 2. Price trend for *P. monodon* from India for 21-25 to 26/31 head count (YC Thampi Samraj, 2008)

The choice of vannamei or monodon also depends on markets. **Panisuan Jamnarnwej**, Thai Frozen Foods Association said that Thailand is the top exporter of shrimp to the US which buys in bulk. With high volumes from vannamei shrimp farms, it is easy to fill up containers. In contrast, collecting the same volume of monodon shrimp would require more than three times the number of farms. Monodon shrimp exports are for a boutique market. This also explains the popularity of monodon shrimp from niche market exporters such as Madagascar for the EU markets.

Threats

Low prices

In Indonesia it was reported that ex-farm prices went down to as low as IDR 32,000/kg for size 50 (USD 2.89/kg). Although China was seventh amongst the shrimp exporting countries in terms of volume, it was tenth in terms of value in 2007. The value of Chinese shrimp at USD 4.86/kg is much lower than that of shrimp from Thailand, said **Xie Biao**. In India, there have been declines in farm gate prices for the monodon shrimp since 1999 but recently prices dropped to as low as INR 230-240 (US4.72/kg) for large shrimp, despite the exchange rate of INR 50 to the dollar. Offer prices in the US markets have been declining at an average of 15 to 20% (figure 2).

The prognosis is to prepare to lower costs and it is least cost with the vannamei shrimp (Wyban, 2008). The current pricing favouring the vannamei shrimp also means an easy switch to its culture. In Vietnam, margins are higher with vannamei shrimp culture. Production costs range from VND 32,000 to 35,000/kg and selling prices are VND 47,000 to 55,000/kg. Culturing monodon shrimp is unprofitable as production costs can reach VND 85,000/kg for 32pcs/kg and selling prices have dropped drastically (50%) in the Mekong Delta to VND 86,000/kg. In India, industry is of the opinion that the way forward for producers will be to do more value adding, certification and organic aquaculture and species diversification with the introduction of *P. vannamei*.

Low demand

Since the third quarter 2008, there have been reports of low demand. Thailand's exports have declined as data showed only 145,983 tonnes of shrimp exports for the first half of 2008. In comparison, exports totalled 348,488 tonnes in 2007. In 2007, Indonesian exports mainly to the US and Japan, totalled 157,544 tonnes in 2007 but for the first nine months in 2008, only 120,000 tonnes were exported. This decline in exports is expected to continue into the first two months of 2009. In most countries, at the farm level, this will translate to lower stocking density

Food safety

Chinese authorities continue to assure the quality and safety of products to regain market confidence in exports from China. In his presentation on Chinese certification schemes, **Ding Baohau**, Quality and Safety Management Centre, Ministry of Agriculture, China said that the future will see the new way of managing quality and safety. There is the concept of LOHAS, Lifestyle of Health and Sustainability covering the environment, sustainable farming and animal health. He added that

Figure 3. Trend in wholesale prices in markets in Shanghai and Dalian (adapted from Gao Jian, 2008).

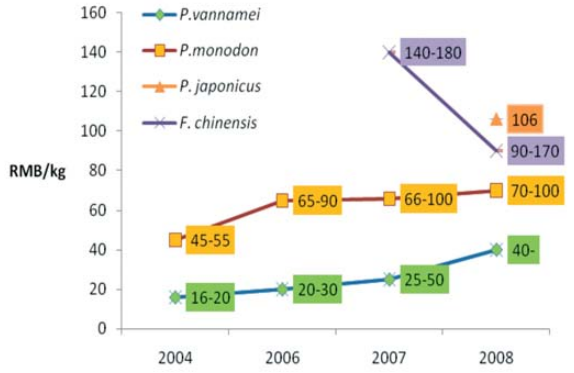


Table 1. Production in 2006* (Fishstat Plus, 2007) and estimates for production in 2008 and 2009.

Country	2006*	2008	2009	%vannamei in 2008
China	1,240,385	1,000,000*	1,000,000*	82%
Thailand	500,800	490,000a	392,000	99%
Indonesia	339,803	276,000a	300,000	89%
Vietnam	349,000	320,000a	350,000	30%
India	144,347	100,000a	100,000	0%
Malaysia	34,973	80,000a	80,000	90%
Philippines	40,654	44,000a	60,000	10%
Bangladesh	64,700	na	na	
Others (Taiwan, Brunei etc)	23,713			
Total	2,738,375	2,370,000	2,342,000	
Vannamei shrimp	1,719,237	1,708,080		
Latin America	334,260	454,000	na	
Global Total	3,072,635			

**Glitnir Seafood Report, 2007. a industry assessments*

Green Food Certification and organic certification by COFCC are current initiatives being promoted. **Xu Chaozhe**, Shanghai Entry-Exit Inspection and Quarantine Bureau said that China's Entry-Exit Inspection and Quarantine Authority (CIQ) will ensure the process from farm to table for exports and improve the level of compliance. Mahmudul Karim said that as quality rather than price or quantity is important, Bangladesh needs to address this issue with its exports to the EU and US to survive the global competition. In Indonesia, the chairman of the Shrimp Club Indonesia, Iwan Sutanto said industry is still optimistic that it can grow and has urged the government to launch global promotions on quality of Indonesia's shrimp product as environment friendly and antibiotic free.

Opportunities

Quality shrimp

Consumers want guarantees of food safety and full traceability. The implementation of "farm to fork" systems, quality control and environmental protection has been taken up in most countries. However, the future will see animal and social welfare issues being added as a market requirement. There is no doubt that Thailand is leading Asian producers in this area. According to Krissana, there are 172 CoC registered farms and 18,365 GAP certified farms in the country. Some 95% shrimp are derived from aquaculture, enabling full control of quality and safety. It is now aggressively promoting the brand 'Thai farm prawns' to gain market recognition.

Domestic markets

In China, local consumption is increasing with changing wholesale prices (Figure 3). China imported 50,000 tonnes of shrimp in 2007 and Yie Bao said that with the rise in the middle class, the shrimp market is a potential market (see page 4). However, Chinese consumers are sensitive to product quality and the demand for high quality is expected to increase as purchasing power increases (Glitnir Seafood Report, 2006).

References are available on request from the editor.

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Requirements: A degree or post graduate degree in Food Science/Technology/Aquaculture or equivalent with over 10 years of experience in shrimp or fish processing plant operations and

- Excellent leadership qualities and inter-personal skills as well as a good mentor and team player.
- Possess excellent communication and technical report writing skills.
- Established contacts with the regional/global seafood network would be an added advantage.
- Extensive knowledge of HACCP and other food safety compliances required by EU, Japan, US FDA etc and current environmental and statutory regulations.
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- entrepreneurial spirit and a can-do attitude.

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Fighting the muddy off-flavour' in the tilapia

By Denny Chavez, Teofilo Rivera, Jaime Quinto, David Moriarty and d Olivier Decamp

Muddy off-flavour in tilapia is responsible for substantial losses to producers as fish are unmarketable. Current solutions include purging fish in separate clear water tanks and special feeding procedures. The use of probiotics is a solution based on work in the Philippines.

In the United States, taint problems caused by blue-green algae cost the farmed catfish industry millions of dollars every year (Fishsite, April 2008). The earthy or muddy off-flavour in fish, shrimp and shellfish is due mainly to two terpenes: geosmin and 2-methylisoborneol (MIB). Geosmin (trans-1,10-dimethyl-*trans*-9-decalol) has an earthy-muddy flavour and MIB (1,2,7,7-tetramethyl-exo-bicyclo-heptaan-2-ol) has a musty flavour. These compounds are problems not only for aquaculture, but also the food, beverage and potable water industries. Human olfactory senses can detect them (i.e. we can smell them) at very low concentrations of 4 to15 ng/litre. They accumulate in the lipids of fish. They can be toxic, for example geosmin is toxic to trout at 0.45 mg/litre and MIB at 10 mg/litre.

Most of the organisms producing these compounds are:

- cyanobacterial species in the genera *Anabaena, Oscillatoria, Phormidium, Lyngbya, Leptolyngbya, Microcoleus, Nostoc, Planktothrix, Pseudanabaena, Hyella,* and *Synechococcus.*
- actinomycete species in the genera *Streptomyces, Nocardia* and *Microbispora*.
- Other microorganisms including several soil fungi, e.g. *Penicillium* and *Aspergillus*, gliding bacteria and the myxobacterium *Nannocystis exedens*.

Some microorganisms excrete geosmin or MIB into the environment, whereas others retain most within the cell. The majority of these microorganisms are benthic or periphytic. Therefore detritivorous fish species that feed on periphyton, benthic microbes or decaying organic matter ingest microorganisms with geosmin and MIB.

The problem in freshwater tilapia

This is common in freshwater tilapia, reared in ponds or in recirculation systems. In a recent article, Guttman and van Rijn (2008) reported how aerobic, organic-rich conditions prevailing in tilapia recirculating systems stimulate the growth of actinomycetes and the subsequent production of geosmin and MIB.

For tilapia products destined for higher value domestic or international markets, the control of off-flavour is a prerequisite to marketing. Most major farms now incorporate a depuration stage between harvest and processing. Purging fish in this manner may lead to a 4% loss in weight. This may be a significant additional cost for the grower. At the same time that the procedure greatly reduces the chances of off-flavour, it also reduces the amount of fish waste excreted in the transport water and contamination of product with fish waste. Nevertheless, such solutions add considerably to cost of production, is time-consuming and labour-intensive.

Microbial management

Specific strains of Bacillus, selected for their ability to inhibit pathogenic bacteria directly, produce exoenzymes to improve digestion and degrade waste products and to grow under a wide range of conditions, e.g. pH, temperature, salinity. These can help alleviate this problem of off-flavour in tilapia via:

- Competitive exclusion of cyanobacteria through competition for inorganic nutrients nitrogen and phosphorus. This would lead to a lower population density of cyanobacteria and/or a different composition of microorganisms. Extensive data from the field worldwide have already shown that these shrimp probiotics control bluegreens very well in shrimp ponds.
- Competitive exclusion of actinomycetes and other bacterial and fungal producers of geosmin, MIB and other terpenoid compounds
- Rapid decomposition of dead algae, faeces and uneaten feed, therefore removing organic nutrient sources for actinomycetes etc.
- Direct inhibition of the growth of terpenoid-producing bacteria and fungi. In particular, strains in PRO-F were selected for the direct inhibition of a wide range of pathogenic bacteria, and the same inhibitory action may also be effective against the actinomycetes.
- Displacement of terpenoid producing microbes from the intestinal tract of fish
- Degradation of geosmin and MIB in water, sediment, fish cage structures and fish intestinal tracts

Field application

The benefit of an appropriate microbial management was demonstrated recently in Ruby Aquaculture Philippines Incorporated, a 6 to 7 million fry/year GIFT tilapia (Genetically Improved Farmed Tilapia) hatchery located in a 25 ha lot in Angat, Bulacan, Philippines. One of the authors, Teofilo Rivera, has designed a system to use the hatchery water effluent in the grow-out ponds. These in turn were stocked with unsold tilapia fingerlings. The stocking conditions vary with the quality of the fry and the demand from the market but usually range from 3 to 5/m^2. Similarly the water exchange program for the grow-out ponds (10 ponds with an area of 4,400 m^2 and 7 ponds with an area 4,900m^2) depends upon the conditions prevailing in the hatchery.

The marketable fish in the grow-out farm had a muddy off-flavour so the farm implemented some measures to minimize the off flavour before selling the fish. This included feeding fish with bread which was not only a time-consuming procedure and expensive but caused many logistic problems.

In microbial management, the farm applied a series of Sanolife probiotics such as PRO-W (a product at a concentration of 5 x10^{10} cfu/g) at 10g/tonne water/week in the grow-out pond water. Another product with a concentration of 1 x10^{10} cfu/g, PRO-F, was top coated

Teofilo Rivera, owner of Ruby Aquaculture Philippines Incorporated (right) and Mr Denny Chavez (left), in front of the field of hexagonal tanks.

View of hapas in tanks used as nursery and the grow out ponds.

onto the feed at 2g/kg for each feeding, giving a final concentration of 2 x10^7 cfu/g feed.

Taste tests were carried out every week and a very noticeable decrease in muddy off-flavour was reported by the third week. During this time, it was also decided to coat the feed with PRO-W at 2g/kg of feed three times a day. This increased the concentration of Bacillus spores in the feed to 1x10^8 cfu/g. Two days after this application, that was on the 23rd day of the treatment, more than 200g fish were harvested and sold with no off-flavour. Fish were more active and had better appearances such as cleaner and shinier scales with the application of the probiotics in the water, according to Jaime Quito.

Conclusion

This application of two Bacillus probiotics was shown to eliminate off-flavour in marketable size tilapia. This protocol was easy to use and did not require fish transfer to separate ponds or tanks. In future, we expect that when the products are used for the whole crop, off-flavour problems will not be an issue. Furthermore, we expect that fish will grow faster, with a lower FCR, as seen by tilapia farmers in Thailand and other fish farmers in the Asia Pacific region (Decamp et al., 2008 & 2007).

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Denny Chavez is with Inve Asia Services, Thailand and **Teofilo Rivera** and **Jaime Quinto**, are owner and farm manager, respectively in Ruby Aquaculture, Philippines. Olivier Decamp and David David Moriarty are with Inve Aquaculture Health, Thailand. David is also attached to the Centre for Marine Studies, The University of Queensland, Australia. Email: Olivier Decamp (olivier@inveasia.co.th)

The pangasius market in Spain

By José Fernández Polanco and Ladislao Luna

The growing market for pangasius catfish from Vietnam is set to grow despite reservations on defrosted products sold as chilled, mislabelling and quality.

Pangasius consumption has grown rapidly in Spain in the last few years. Frozen or defrosted fillets can be found in any fish shop in the country and its acceptance by consumers is increasing. However, this success in the domestic market has aroused suspicions and reactions. Groups related to the production sector applied for greater restrictions and controls. However, Spain is one of the largest seafood markets in the world and foreign trade constitutes the largest source of seafood supply. Spain will keep importing seafood and those products that meet food quality and safety demands will continue to enjoy sales in this interesting market.

This paper briefly describes the evolution of the pangasius fillets imports, common marketing practices and the profile of consumers who prefer pangasius as a seafood item and include the fish among their three most preferred seafood species.

Seafood consumption in Spain

Seafood is an important ingredient of the Mediterranean diet which includes the Spanish cuisine. The consumption of fish is deeply rooted in the traditional Spanish culture. Per capita seafood consumption was 36.7 kg in 2006 which was an increase of 1.6% over that in 2005. In 2006, the apparent consumption of fishery products was 1.98 million tonnes, which accounted for slightly more than 20% of the total seafood consumption of the EU15 countries. Among seafood buyers, preferences are towards fresh seafood, which accounted for 70% of total seafood sales, followed by that for whole fish. Hake, sardines and sole are the three most appreciated species among consumers (MAPA, 2007).

Habits and traditions play an important role in the way seafood is consumed. It is a difficult market for exotic species and processed products. However, the Spanish have managed to adapt to changes in global markets and some new species and presentations have been well accepted by consumers. This is the case with processed species of non-european hake, Nile perch, tiger prawn and different varieties of surimi. Even so, as in many other countries, Spanish consumers still prefer local species which usually demand the highest prices at the market place.

Imports of fish fillets from Vietnam

Pangasius fillet is one of those exotic products that have managed to be a choice option among Spanish consumers and sales have increased significantly in recent years. According to data from the Spanish customs office (Table 1), imports of fish fillets from Vietnam have increased from a mere 397 tonnes in 2002 to 38,530 tonnes in 2007. The pangasius fillets are included in the tariff nomenclature 03042019, which brings together the fresh water frozen fish fillets with the exception of trout. This nomenclature accounted for the 30.32% of total imports of fish fillets from Vietnam in 2002 which rose to 88.42% in 2006. The largest increase is recorded between 2003 and 2004, when the rate of change was 5.2% for the total Vietnamese frozen fish fillet nomenclature (030420), and 9.89% in the case of frozen freshwater fillets. Since that date, imported quantities, under both nomenclatures have continued to increase to current figures. Comparatively, the total Spanish imports of fish fillets from all over the world had a rate of change of 0.55% in the same five years (95.9% for Vietnamese fillets). The contribution of Vietnamese fillets to the total imports from all over the world grew up from 0.3% in 2002, to 20.27% in 2007.

Table 1. The evolution of fish fillets imports in Spain (2002 – 2007)

	Total fish fillets		Vietnamese fish fillets		Viet. frozen freshwater fillet	
	tonnes	€/kg	tonnes	€/kg	tonnes	€/kg
2002	122565.7	2.92	397.3	3.7	8120.5	3.34
2003	144461.1	2.67	1093.0	2.76	531.3	2.54
2004	151589.6	2.68	6782.7	2.63	5789.8	2.55
2005	144766.6	2.85	11820.6	2.41	9772.3	2.36
2006	174690.5	2.92	25469.2	2.42	22521.2	2.45
2007	190104.9	3.05	38530.9	2.21	n/a	n/a

Source.- Agencia Tributaria. Base de Datos de Comercio Exterior.
Available at: http://aduanas.camaras.org/

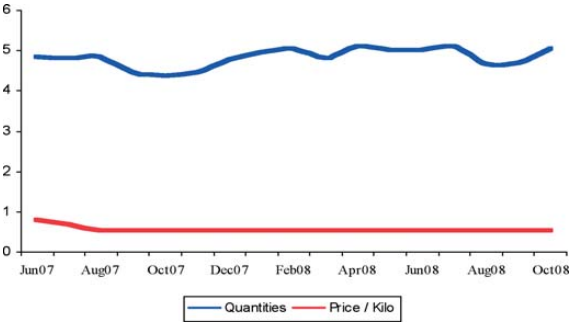
Decreasing value of fillet imports

In contrast, the declared value per kilo decreased slightly in all categories. Fish fillets imports from Vietnam fell from €3.78 /kg, in 2002, to €2.21/kg in 2007. The average value registered between January and June 2008 was €1.82 /kg, indicating that the downward trend in prices will remain this year. This trend seems to be stabilizing for all Spanish fish fillet imports. Even so, the statistical properties of the Vietnamese value per kilo series coincide with those of the total. The reference price for the Vietnamese fish fillets is around the average of the whole fillets imports. Since 2004, when the largest increase in imports was recorded, prices of Vietnamese fillets stood slightly below the total average.

This data allow us to conclude that pangasius fillets have contributed decisively to the increase of the Spanish fish imports from Vietnam, with a higher growth than all other fish fillets exporters to this European country. Some of these countries have reduced their exports to Spain. In this way, it seems that pangasius has been successful in shifting the front line of competition at the Spanish fish fillet market.

Stability in supply and a lower price than other fillets are some of the factors for this success. Attributes such as quality and safety will be key to maintain this success in the future, and overcome the turbulences in the market. The guidance of VASEP and Vietnamese producers toward certification and product quality control, is a good option to ensure the market in the coming years (Nguyen, 2008).

Recent evolution of pangasius sales and prices at the Madrid Wholesaler Fish Market. (Log scale).



Source.- MercaMadrid.
Available at: http://www.mercamadrid.es/en/estaddisticas.html

Marketing pangasius in Spain

As with any aquaculture species, pangasius presents to the intermediaries the advantage of a continuous supply and adaptable to demand. In addition there is a great stability in the wholesale price. Data from the largest wholesale market in Spain (MercaMadrid) show that in the past two years, supply has fluctuated in accordance with the usual seasonal demand, while the price has remained unchanged at 3.31 €/kg (Graph 1). Retail prices prices vary between 6 and 8 €/kg, although sometimes it can be more or less than these values.

Defrosted pangasius fillets at a traditional Spanish fish market.

Mislabelling of pangasius. (Gallo = Flounder).

Although most of the fillets come frozen, there is also a significant amount of defrosted products by local processors. The idea is to adapt to the group of consumers who do not buy frozen fish. The name used to market these are 'panga', although in some fishmongers and retailers chains, there are other misleading local names. This practice produces confusion among consumers, harm the product image and arouse suspicion in some cases. Authorities are carrying out measures to improve and control fish labelling at points of sales, by enforcing the law and looking to avoid consumer confusion. Some promotional efforts are being carried out by processors and retailers.

The Spanish pangasius consumer

Data from the latest aquaculture consumer habits survey (MAPA, 2008) allow us to make a profile of those consumers who have included pangasius within the three seafood species most consumed. These subjects represent only 0.8% from a 2,998 sample of seafood consumers. A majority of them (63.6%) habitually buy fish in hypermarkets. The demographic profile of these consumers only differs from the sample in their distributions by education level and income. The education level

Discounted pangasius frozen fillets at a hypermarket.

Promotional poster at a supermarket front wall.

in the group of interest exceeds that of the sample, while, the income levels are below the population average (Table 2). Income distribution suggests that price may be a factor for the preference of this group in buying the pangasius fillets. Further research should provide more information on attributes perception, motivations and preferences.

Table 2. Profile of pangasius consumers by education level and income.

	Education			Income	
	Pangasius	Sample		Pangasius	Sample
Ill Educated	0%	7.18%	< 10.000	35%	33.05%
Primary	40%	34.82%	10,000 - 20,000	40%	39.52%
High School	35%	33.58%	20,000 - 30,000	25%	19.29%
University	25%	24.08%	> 30,000	0%	8.13%
Total	100%	100%	Total	100%	100%

Source.- Analysis with data from MAPA (2008).

References are available on request from the editor.

José Fernández-Polanco is Professor of Marketing Research at the University of Cantabria (Spain). He has a PhD in business management and has coordinated the study on 'consumption habits of aquaculture in Spain (2003 - 2007)' within the framework of a cooperation agreement between the Economic Management for the Primary Sector Sustainability Group of the University of Cantabria and the Spanish General Secretary of Marine Fisheries. His main interests are seafood consumer behaviour and marketing for fisheries and aquaculture. Email: polancoj@unican.es

Ladislao Luna is Professor of Business Organization at the University of Cantabria (Spain) and Director of the Economic Management for the Primary Sector Sustainability Research Group. He has a PhD in business management and since 1998, has been conducting research in several areas of social and economic sciences in fisheries and aquaculture for different public and private Spanish institutions. His main interests are business management and social responsibility.

VIV Asia 2009

This is undoubtedly the main platform for the animal feed production and feed additives market in Asia and an opportunity for companies to network. The 2007 edition attracted 21,726 visitors from 34 countries. In 2009, the theme for the livestock industry will be 'Eggs!' to accelerate the egg business in Asia. Another feature is the focus on aquaculture with a dedicated pavilion with more than 20 exhibitors. The exhibition and several concurrent conferences will run from 11-13 March 2009 at BITEC, Bangkok, Thailand.

At the Press Conference. From Left: Supawan Teerarat, Ladda Mongkolchaivivat, Director Livestock Department, Ruwan Berculo and Christoffer Ernst, Sanovo Staalkat.

The event is organised by VNU Exhibitions Europe and NCC exhibitions of Thailand in collaboration with Thailand's Livestock Department. At Meet the Press conference in December, Ruwan Berculo, Project Manager, VNU said that the response was good at previous shows of VIV Asia. This year the number of booths available is increased to 500 and with three months to go, he indicated 95% of the floor space has been taken up. The event will also feature country pavilions for Belgium, China, France, Britain, Israel, Italy, Korea, Netherlands and Spain. VIV Asia 2009 is expected to draw 22,000 visitors, 50% from Thailand, said Ladda Mongkolchaivivat, General Manager, NCC, making this the largest show for this industry in Asia. She added that amidst the current economic situation, the show will strengthen the advantage of industry in Thailand and Asia, in increasing production and their competitiveness.

Similarly, Sinchai Ruangphaibul, Department of Livestock believes that the THB 302 billion Thai industry which contributes 3.4 % to GDP will have a real chance in world markets. In 2009, it is expected to grow by 2.2% with a focus on product development, quality, food safety, traceability and nutrition. The event also has the support of Thailand's Convention and Exhibition Bureau (MICE) and will have a dedicated channel to speed up immigration clearance.

Dates	March 11	March 12	March 13	More information: Steven Fockema Andreae Sales Manager Asia-Pacific VNU Exhibitions Europe B.V. Tel: (+31) (0)30 295 2302 Fax: (+31) (0)30 295 2809 Mob: (+31) (0)6 5142 6924 steven.fockema@vnuexhibitions.com
Opening hours	10.00am to 6.00 pm	10.00am to 6.00 pm	10.00am to 4.00pm	
Venue	BITEC, Bangkok International Trade & Exhibition Centre, Bangkok - Thailand			
Admission	Admission is free for trade professionals, business visitors, holders of invitations and registered only. Online registration and more information: www.viv.net			

Dedicated to aquaculture at Aqua VIV Asia 2009

This dedication to the promising world of aquaculture within the VIV Asia began in 2007 with the launch of the Aqua Forum and Aqua Walk. Demand for aquaculture products and solutions followed the demand of 26% of visitors during previous shows, said Ruwan. This year the event will feature 20 exhibitors in the Aqua Pavilion highlighting their aqua products during the three days. Some 100 exhibitors in the 'Aqua Walk' will feature some aqua products alongside other products. During the forum for aquaculture, there will be 20 slots for technical and products presentations. In addition, there will be two full day conferences presented by Novus Aquaculture and Bayer Animal Health on March 11 and 12, respectively (see box).

Companies present at the meet the press session regarded this has a major event for their products. Selected companies revealed their focus at the show. Most recent lab tests on mycotoxin in feed ingredients conducted as part of the ongoing Biomin Mycotoxin Survey Program, have revealed the critical need to manage mycotoxin contamination, especially with the latest corn crop in the Asian market which has high levels of aflatoxin. Yvonne Lim, Regional Marketing Director said specialty feed additives include Mycofix® range of products for aquatic animals which offer the most complete strategy to counteract mycotoxins. Research at the R&D centre in Thailand will soon publish more reports on the effects of probiotics, acidifiers and phytogenic products in fish and shrimp.

Kurt Wegleitner, Sales and Marketing Director said that two sustainable alternatives for aquaculture from Addcon include Fish Form Plus, a preservative for raw fish for fish meal production and Aquaform, a non antibiotic growth promoting feed additive. KMP Biotech, a leading biotech company Thailand is looking at securing distributors for its products such as probiotics Bacto-Sac-P for shrimp and fish, enzymes and tests for controlling salmonella in livestock production, said Woranan Phumpakdeephan. Kornwipar Komonwitayakun, Novus Aqua said that the focus at the show will be to showcase its product portfolio for aquaculture including products for the feed mill, water treatment, hatchery and probiotics. R&D on fish and shrimp with these products will soon emanate from the recently opened R&D centre in Vietnam (see page 48).

As part of the program, journalists visited Nam Sai Farms, a 300,000 fry/month hatchery in Ban Sai, Prachinburi Province. Warren Turner, General Manager (centre) explained the sequences in the production of monosex tilapia, mainly for the grow-out in ponds and cages market throughout Thailand. Fry are also exported. The company produces four strains of Nile tilapia (Chitralada, GIFT, Nam Sai and Big Nin) and 3 strains of the red tilapia (Thai red, Taiwanese red and Nam Sai red). Other species are the striped catfish Pangasius hypothalamus and weaned sea bass Lates calcarifer

Aqua VIVAsia 2009

In the November/December 2008 issue, we featured companies in the Aqua Pavilion as well as those in the main part of VIV Asia 2009 offering aqua solutions and products for aqua feed production. More companies are featured below.

Alltech Biotechnology will focus on Food safety for Sustainability at VIV Asia from 11-13 March. Products will be Sel-Plex, organic selenium; Bioplex, organic trace minerals; Allyzme SSF which allows for better digestion and flexibility in diet formulation and Deodorase which will help to reduce ammonia and improve water quality. "The Alltech aquaculture programme meets the requirements of today's markets where performance targets can be met at a lower unit production cost, improving quality and satisfying the traceability and food safety standards of all markets. The company will exhibit at booth number A036 in Hall 1 and will have a dedicated section showcasing the company's solutions for enhancing the health and performance of aquaculture species",- Orla McAleer, Marketing Manager Asia-Pacific

Booth: A036
Contact: Orla McAleer (omcaleer@alltech.com)
Web: www.alltech.com

Aova Technologies Inc, USA will be introducing a BIG breakthrough with a bold new strategy that enhances nutritional performance in aquaculture. BIG FISH utilizes natural immunoglobulin proteins to minimize unnecessary intestinal inflammation in aquaculture species. Research trials have shown that diets supplemented with BIG Fish led to an increase in weight gain and improved feed conversion as well as survivability in challenged environments.

- All natural microfeed ingredient
- Unique mode of action utilizing specialized immunoglobulin proteins
- Over 20 years of technology development
- Patented technology

Booth: AQ22
Contact: Kyle Montgomery (kyle@avoatech.com); Web: aovatech.com

aova technologies
powering animal agriculture

Bayer HealthCare's aim is to discover, develop, manufacture and market products that will improve human and animal health worldwide. With sales of EUR 956 million in 2007, the Animal Health Division is one of the world's leading manufacturers of veterinary drugs. The division produces and markets approximately 100 different veterinary drugs and care products for livestock and companion animals. The subsidiary of Bayer AG will have two booths, one in the livestock section and one in aqua at the show.

Aquaculture is one of the fastest growing segments in the food animal business and Bayer Animal Health has been supplying customers with scientifically proven solutions to support their aquaculture business for more than ten years. It will host the forum "Innovations for Sustainability in Aquaculture" on March 12. It has invited international leaders in aquatic health and hatchery management to share their expertise.

Booth AQ21 and C 056
Bayer Thai Company Limited Asia Pacific
Contact: Jan Koesling (jan.koesling@bayerhealthcare.com); Web: www.bayerhealthcare.com

Biomin, a leading company focusing on animal health and nutrition, develops and produces specialty feed additives and premixes. These solutions address dietary requirements for aquaculture including solutions for mycotoxin risk management (Mycofix®), phytogenic growth promotion (Biomin® P.E.P. and Biotronic®), Biomin® AquaStar probiotics, and Biomin® AquaSpecials for pond treatments, shrimp hatcheries and pond grow out.

Visitors can preregister at www.vivasia.biomin.net to schedule an appointment with technical experts at the Biomin booth. They can also receive an information pack with mycotoxin survey 2008 report, series of white papers including those on feed formulation strategies and balancing performance and profitability for aquaculture.

At the Aqua Seminar, Dr Pedro Encarnacao will speak on 'Balancing performance and profitability for aquaculture' and at the Eggs! Conference: Dr Tobias Steiner will provide 'New Concepts on the Horizon: Phytogenics in Egg and Poultry Production'. Mrs. Ursula Hofstetter will present 'Controlling mycotoxins in feeds' at Mycotoxin 2009.

Booth: A010
Email: asiamarketing@biomin.net; Web: www.biomin.net

Jefo Nutrition Inc. has been involved in the supply of innovative feed ingredients for animal nutrition for more than 25 years. The company was the first ever to sell a single stable protease enzyme for animal nutrition. During the last 5 years Jefo has developed applications for the protease enzyme under the name of AG 175 in aquaculture feeds.

"This event will be the official launching of AG 175, a stable protease enzyme for aquafeeds. We will participate in the Aqua Seminar on the 11th of March for a 30 minute technical presentation. This stable protease enzyme can be used in fish and crustacean feeds either to improve performance, to reduce the usage of fish meal in the feed formulas to offset the effect of some antinutritive factors in novel feed ingredients or to introduce more vegetable protein sources in aquaculture feeds."- Robert Gauthier

Contact: Dr. Robert Gauthier (rgauthier@jeffo.ca); Web: jefo.ca, Email: info@jefo.ca

INVE consists out of 30 companies that provides nutritional and Health solutions in animal rearing. It is active in more than 70 countries and has production units in Asia, Europe and the Americas. The company's backbone is its strong global R&D departments organized by Inve technologies N.V. The group will have two business units at VIV Asia 2009. Through an extensive network of first line technical people, solution managers, Inve shops and local service centers, the company follows a strong personal market approach focusing on long term, partnering relationships with customers. Through daily contact with customers, Inve simplifies feed management for farmers and hatcheries, resulting in more efficient working procedures and high qualtity results, offering economic benefits to the customers.

Booth: Aqua Pavilion AQ 11
Contact: Rudi Bijnens (rudi@inveasia.co.th); Web: www.inve.com; email: iass@inveasia.co.th

INVE Nutri-Ad combines the competence in specialty feed additives and the experience in aquaculture nutrition resulting in 5 programs, addressed to aqua feed producers.

- Adimix and Nutrizym Aqua for performance enhancement, improving feed utilization and animal performance.
- Toxy Nil Aqua, Salmo Nil Aqua for food safety, addresses mycotoxin and bacterial contamination of raw material and feed.
- Antioxidants and mold inhibitors such as Oxy Nil Aqua, Mold Nil for preservation and stabilization.
- Nutribind aqua dry for production aid and ensures the physical quality of the feed and
- Sentiguard for health and well being while supporting the immune system

Booth No: Hall 2, C020
Contact: Jan Maarten Persyn (jmp@inveasia.co/th)
Web: www.inve.com Email: invenutriad@inveasia.co.th

Kemin Industries Inc. represented by Kemin Industries Asia (Singapore), focuses on improving the health and nutrition of animals through ensuring the nutritional integrity of feeds. Established in 1961, Kemin is a global company with specialisation in multiple areas of the nutritional business. Feed preservation through mould inhibition and oxidation control are fundamental areas of nutrition.

"Through antimicrobial and mycotoxin control strategies, Kemin ensures the improved health status of the animals. Bio-surfactant products further improve lipid nutrition and nutrient absorption for optimised health status. Visit us to discuss how we can help optimise your aqua business", -Edward Manchester, Product Manager Aquaculture.

Booth: G074 (Hall 1)
Contact: Edward Manchester, (edward.manchester@kemin.com)

Skretting Asia, represented by PT Trouw Nutrition Indonesia is bringing its "feeding your passion for fish' vision to the show for the first time. The Norwegian company, a world leading fish feed producer always looks to the future. It was the first to use extruders in fish feed technology and the first to understand the significance of R&D in feed development. In Asia, the aim is to develop the right feeds for the right species and be fully aware of the different conditions, needs and preferences. It will introduce a new line of microencapsulated feeds for the marine hatchery. These combine health and nutritional strategies to improve hatchery performance and quality of fish production for the sea bass and red snapper. The line will complement the Origo range of live feed diets for cleaner and more efficient culture and enrichments of rotifer and artemia. A new line of shrimp hatchery feeds is in development.

Booth B024
Contact: Ton Hovers (Ton.Hovers@nutreco.com)
Web: www.skretting.com

YeCherng Industrial Products Co., Ltd is devoted to producing bio-secure, and green products for the achievement of best quality of feed for more than two decades. It has a total solution to the animal production industry in a safe, environmentally-friendly way (see page 47).

Booth L033
Contact: Erica Lin (ericalin@yecherng.com);
Website: yecherng.com Email: info@yecherng.com

Conferences

March 10 Mycotoxin 2009, a one day technical conference by Positive Action Publication. It will provide a comprehensive overview of key hazard in modern livestock production. More details from www.positiveaction.co.uk

March 11 The latest development in aquafeed nutrition is a one day technical conference organized by Novus Aqua. This will cover catfish nutrition, shrimp broodstock nutrition, application of enzymes, organic feed, alternative protein sources and cost effective formulations. More details, email: aquanovus@novusint.com

March 12 "Innovations for sustainability in aquaculture", one day technical conference at the Aquaculture Forum by Bayer Animal Health. More details, email: jan.koesling@bayerhealthcare.com

Aqua seminars as of press time

Wednesday 11 March

- High performing minerals for a demanding and dynamic industry - Sven-Olof Malmqvist, Yara Phosphates
- The use of a stable protease enzyme in aquaculture feeds or how to reduce feed cost and improve performance in high protein diets for fish and crustacean - Dr Robert Gauthier, Jefo Nutrition
- New applications of extremophiles fermentation in aqua feeds - Dr Mao Yen Chen, Green Era Bio-Tech Corp
- The "Dream-Team" to manage the WSSV (White Spot Syndrome Virus) threat - Dr Jan Koesling Bayer Health Care
- Performance of palatability enhancer in marine and freshwater fish fed feed containing different levels of fish meal - Vincent Fournier, Aquativ

Thursday 12 March

- Rovimix® vitamin premixes, quality criteria and biological functions - Dr. Jacques Gabaudan, Manager, DSM
- Liptocitro, a natural growth promoter - Laura Muñoz, Liptosa
- Are you ready for the aquafeed of the future? Innovative additives to improve performance and formulation cost of feeds for fish and shrimp - Dr Peter Coutteau, Inve Aquaculture
- Review of extrusion advancements related to aquatic and animal feeds - Joseph P. Kearns, Wenger Manufacturing, Inc
- Benefits of using technology in sustainable aquaculture farming - Jan Erik Svensson, AKVA Group
- Applied plasma physics and atmospheric chemical principles in odour abatement - Dr. Jon Are Beukes, Applied Plasma Physics

List of companies with products for aquaculture

AKVA group SEA Co., Ltd.	Aquaculture technology	Thailand
Alltech Biotechnology Corp., Ltd.	Feed ingredients & additives	Thailand
Aovatech	Feed ingredients & additives	USA
Adcon	Feed ingredients & additives	Germany
Applied Plasma Physics ASA	Feed processing	Norway
Aquativ	Feed ingredients & additives	France
Aqua Culture Asia Pacific	Publication	Singapore
Bayer Health Care	Animal health	Thailand
Beijing Sunpu Biochem. Tech. Co. ,Ltd	Feed ingredients & additives	China
Biomin	Animal health	Singapore
Chemoforma Ltd.	Feed additives	Switzerland
Colorite plastics/ Aero Tube	Aeration	USA
DSM	Feed ingredients & additives	Thailand
Du Pont (Thailand) Limited	Animal Health	Thailand
GePro Geflügel-Protein Vertriebs-Gesellschaft mbH & Co. KG	Feed ingredients & additives	Germany
Green Era Bio-Tech Corporation	Feed ingredients	Philippines
Intervet International B.V.	Animal Health	The Netherlands
INVE Asia Services Ltd	Health and nutritional solutions	Thailand
Jefo Nutrition Inc.	Feed additives	Canada
Liptosa	Feed additives	Spain
Trouw Nutrition Asia Pacific	Feeds and ingredients	Indonesia
Novus International Thailand Co. Ltd.	Health and nutritional solutions	Thailand
Omega Protein, Inc.	Feed ingredients	USA
Pharmaq A.S.	Animal Health	Norway
Tekni-Plex Technologies (Suzhou), Co. Ltd.	Aeration	China
Wenger Manufacturing	Feed processing	USA
Yara Feed Phosphates	Feed ingredients	Sweden
Zhejiang Esigma Animal Health Co. Ltd	Feed ingredients & additives	China
Zymo Nutritients Private	Feed ingredients & additives	India

VIV Asia 2009

March 11-13, Bangkok - Thailand

Aqua VIV Asia 2009

VIV Asia presents Aqua VIV Asia, the 1st dedicated event for Asia-Pacific's aqua business.

Seeding the abalone in the Visayas

In an area of 1,000 m², 13.5 kilometres south of Iloilo City in the Visayas, West Central Philippines. Rey A. Acap of the Aquaculture Techno-Center AQUATECH is now producing half million of the donkey abalone, *Haliotis asinina*, spats annually. This is the start to an emerging industry in the Philippines with an expected production of 20 tonnes in 2008.

Rey A. Acap

The donkey abalone is endemic to these islands in the Philippines. There are 5 known species of abalone in the Philippines but only two species; *H. assinina* and the smaller *H. glabra* have been tested for commercial farming. Rey started this in 2005, after three years in collaboration with the Rural Bank of Oton, SEAFDEC-AQD and the Bureau of Fisheries and Aquatic Resources (BFAR), Regional Office No VI, to develop protocols for the management of the tropical abalone hatchery.

The critical aspect in any abalone hatchery is the management and later in the spawning process. Rey said, "In the hatchery stage proper monitoring should be done during the settlement stage (day 0 to day 90) in which young abalone is very sensitive to any environmental changes. At the grow-out culture the most critical aspect is site selection and farm management".

Rey collects wild brood stock from different locations such as from the Municipality of Concepcion, Iloilo and Island province of Guimaras and holds them for two to three months in indoor tanks, feeding them with the *Gracilaria* seaweed.

The production cycle of the donkey abalone covers three months from spawning to settlement. After spontaneous spawning of males and females, eggs are collected and transferred to 200 litres incubation tanks. After eight hours, fertilized eggs develop into trocophores. Two hours later trocophores develop into veliger and are transferred into settlement tanks. The water in these tanks is sand filtered and passes through an ultra violet sterilizer. Veligers or larvae are kept for a week in these tanks with static water condition. Feeds are composed of benthic diatoms, *Navicula* and *Amphora*. In the next stage, once the veligers attach to settlement plates, flow through water is used. The veligers are reared up to the advance veliger stage for the period of two to three months until it reaches the juvenile stage (3mm shell length).

The two species of abalone of commercial importance in the Philippines. Left, the smaller H. glabra and (right) brood stock of the larger H. assinina with white gonads.

Abalone enhancement program

Hatchery techniques are now well established and have been used for an abalone enhancement program. However, Rey said, "The hatchery techniques may have helped us to restock the natural environment but it is important to conduct studies on how to culture abalone in cages. We have devoted time and resources in different trials in order to establish the most appropriate culture techniques for our country and for this abalone species".

The centre does not carry out the grow-out of the spats to marketable size. It merely produces spats of 1 to 3 cm shell length in its hatchery facilities. Spats are collected and transferred to indoor nursery nets for a month.

Collectors and spats on collectors

Gracilaria is a cheap and readily available feed for the abalone

This nursery net developed by the centre can hold 600 spats of 3.5 to 4cm.

Checking abalone cages before stocking

The grow-out stage is conducted in different areas and in sea cages. The nursery cage with 5mm mesh can hold 600 spats of 1cm to 4cm for two months. These are then transferred to containers with larger mesh sizes at a density of 300 pieces/cage for two months and later the density is reduced to 150. Grow-out in the sea is for 6 to 8 months. The marketable size is 50-80g. A single cage produces about 10 kg of abalone in 6 to 8 months. In a modular system developed by Aquatech, farmers can enjoy a harvest every 2-3 months.

"In an area of 35-50m^2, the production from stocking 3,000 juveniles, can be 150kg of marketable abalone every 2-3 months. The mortality rate is 10% and after 8 months, the total production will generate a net income of PHP 37,000 (USD 767). This is achievable because feed costs are low with the gracilaria", said Rey.

Future challenges

Presently, Aquatech is undertaking trials on low cost tank culture of abalone. Hopefully with the support from Bureau of Fisheries and Aquatic Resources in Region VI the technology can be disseminated to coastal fisher folk in the country. In addition, the centre has developed its own strain of saline tolerant tilapia. Studies in the hatchery and culture of sea urchin (*Tripneustes gratilla*) are also ongoing.

"We are embarking all these to rejuvenate the aquaculture industry in this part of the region', said Rey

ISTA8

From the Pharaohs to the future

By Eric Roderick

The farm at the Egyptian Aquaculture Centre.

It was very fitting that the 8th International Symposium on Tilapia in Aquacultulture ISTA8 chose to celebrate its 25th anniversary in 2008, by holding the event in the birthplace of tilapia-Cairo. Egypt is the second largest producer of tilapia in the world after China, with a production of 600,000 tonnes in 2007.

ISTA 8, held from 12 to 14 October 2008 was organised under the expert guidance of **Prof Kevin Fitzsimmons**, University of Arizona USA. **Prof Hussein Elghobashy** was the local conference coordinator for the conference, trade show, farm visit and social gatherings. The symposium was hosted by the Ministry of Agriculture and Land Reclamation and the Central Laboratory of Aquaculture Research CLAR in Abbassa, along with the American Tilapia Association (ATA). It was co-sponsored by US-AID, the AQUAFISH CRSP, World Fish Center and the World Aquaculture Society.

At the opening, the Counsellor to the Minister of Agriculture and Land Reclamation, **Prof Saad Nassar** highlighted the increases in aquaculture production in Egypt, the potential for new export agreements for tilapia to the EU markets. Fish and fisheries products are the main source of animal protein for the poor people with consumption at around 20g/day/capita. Presently, aquaculture contributes 60% of the Egyptian fish production of more than one million tonnes/year. Most of this production is tilapia. The Ministry of Agriculture has plans to increase this to 1.5 million tonnes by 2015. The government have incorporated new laws to encourage investment from Egyptian and foreign companies in fish research and production. Assistance is offered both in terms of finance and technical support. Currently, fish farms can use freshwater whereas previously they could only use drainage water. Water reuse is given a high priority especially for water used for crop irrigation projects. These new regulations should enhance production and fish farm development and increase investments in the aquaculture sector, with a view to exporting high quality products to the EU.

The opening ceremony was followed by the main keynote speakers. **Kevin Fitzsimmons** gave an overview of the global markets and the continuing expansion of this huge industry in the US, based mainly on imported fresh product from Latin America and frozen whole fish and fillets from Asia. Value added products are now taking a far greater market share, with imports of whole fish actually falling, in relation to fresh and frozen fillets. Although Egypt produces huge quantities of

Tilapia harvesting at one of the ponds

Egyptian Feed company (Joe Trade Co.) reported brisk business.

Intervet/SPAH stand at the trade show. Cedric Komar of Intervet, Singapore gave an excellent overview of diseases in tilapia, and the preventative measures available to the industry.

tilapia, there is almost no exportation, as all production is absorbed by the domestic market. Egyptian constraints to exportation were also discussed. These being primarily the production of tilapia in sub-optimal water conditions, lack of HACCP and ISO certified processing plants, lack of value added capabilities and a shortage of by-product industries.

Yang Yi in presenting 'Strategies for nile tilapia pond culture' looked at maximising yields for small scale subsistence tilapia farmers in Asia using a range of inputs designed to increase yields. As expected, more inputs yield greater outputs, but he showed that it is still viable to produce tilapia with only pond fertilisation and no supplementary feeding.

Jesse Chappel and his team at Auburn University have developed an energy efficient integrated system approach, where tilapia waste water feeds though an aquaponics system producing tomatoes. In this experimental unit, 10-12 tonnes of tilapia are produced per year, along with a similar quantity of tomatoes. From the data shown this could be a viable alternative for farmers wishing to diversify and increase profitability.

Jooste de Smed who runs VitaFish in Belgium presented 'lessons learnt with intensive recirculation systems for tilapia in Europe'. He highlighted the fact that aquaculture is not a sure thing, and a licence to print money. With an initial investment of 15 million Euros and a 4,000 tonnes capacity, with 20,000 m^3 of recirculated water and 55 staff, it is one of the largest recirculation farms anywhere in the world. Unfortunately, due to the importation of several different stocks of fish, a major disease outbreak closed the plant and after a full shut down and sterilization, it has now reopened and building up its own stock. This shutdown was a huge loss to the company and many lessons have been learnt.

Due to the large number of academic papers accepted for an ISTA conference (112 papers), there were several concurrent sessions in the programme. Feed and in particular replacement of fish meal was well covered, with many researchers discussing utilizing local plant ingredients and waste products as a supplementary feed for tilapia. Probiotics also featured prominently. Many papers also looked at alternatives to the use of methyl testosterone for sex reversal of tilapia, for use in monosex culture. There were numerous references to the YY male technology. Genetic studies compared growth rates under a wide range of culture conditions and most of the leading strains compared favourably. Disease studies were far more numerous than in previous ISTA conferences and highlighted the need for good biosecurity, especially in intensive farming.

Although a small trade exhibition by today's standards, most of the farmers' requirements were catered for, from improved brood stock to nets, cages, aerators, chemicals, feeds, computer software, and processing equipment. Exhibiting companies were mostly from Egypt with some international companies such as gold sponsor Intervet Schering-Plough Animal Health and Fishgen. Skretting was represented by their local agent Hedrix Misr. Another company exhibiting was Grand Lake Company for Fish, a fishing, farming and fish processing company from Lake Nasser, a man made lake near Abu Simbel which currently produces over 30,000 tonnes a year. They supply fresh tilapia, catfish and Nile Perch throughout Egypt and also export frozen products. As most of the product is wild caught, they had some extremely large tilapia fillets as well as a few very large whole tilapia in excess of 3kg. Al Maram Multi Trade, aquaculture and fisheries consultants offered Pioneer paddle wheel aerators, for which they are the exclusive distributor in North Africa.

At the conference dinner, the Tilapia International Foundation, a charity based in Holland, whose objectives over the past 30 years are to promote and raise tilapia to fight malnutrition all over the developing world, made a "lifetime achievement" award to Dr Marc Verdegem for his excellent contributions in promoting tilapia on a global level. There was also book signing at the trade show, one by Professor Abdel-Fattah M.El-Sayad from Alexandria University, Egypt on 'Tilapia Culture' and another by Kevin Fitzsimmons on 'Tilapia Biology Culture and Nutrition'. The last day was a visit to the Egyptian Aquaculture Center, a 'training and applied research limited partnership company'. Conference farm visits can be highly variable, but apart from the long travelling time, the visit was excellent and highly informative and the staff under the leadership of Dr Ismail Radwan had laid on several demonstrations, some lectures and of course an excellent tilapia dinner which highlighted the versatility of the "aquatic chicken".

***ISTA9** in **2010** will be held in **Shanghai** and will be a joint meeting with the Asian Fisheries Forum. This will be organised by Kevin Fitzsimmons and Yang Yi.*

Eric Roderick is CEO of Fishgen Ltd, and is a Global consultant with 25 years experience in the tilapia industry, having been involved in projects in over 30 countries.

Aquafair Malaysia 2008

More players in an attractive market

The fair saw the continuing attraction of the arowana among ornamental fish collectors and the lure of new species at this 4 day show for trade and public alike.

Arowana,the symbols of prosperity and wealth still commands attention.

This is the second show in the series to showcase industry in Malaysia. The export potential of the ornamental fish industry is lucrative and there are now more players, in particularly for the arowana *Scleropages formosus* sector. Breeds of arowana were the main attraction and fish of five months sell for RM 2,000 each (USD576) for the golden arowana to MYR 3,000 (864) for the silver arowana. Farms are concentrated in two locations, Batu Pahat in Johor in the south of Peninsula Malaysia and in the north in Bukit Merah, Perak.

Among the farms at the show was the two year old Bukit Merah Aquaculture breeding farm (www.bmaquaculture.com) which displayed its flagship 'golden arowana'. Other breeds were the red arowana, Indonesian golden, Malaysian high back, green and silver arowana. Another farm is Arowana Aquaculture which operates 98 culture ponds and specialises in the Malaysian gold arowana, red tail golden arowana, super red and banjar red arowana. MU arowana focuses on the production of Malaysia gold arowana in its 99 ponds. The arowana as an endangered species requires Cites approval but this applies to selected breeds.

In the ornamental fish industry, uniqueness creates attention and brings in better prices. At the Everise Aquaculture booth, there was a super red arowana with longer than usual pelvic fins. Although not for sale, the value was estimated at MYR 10,000 (USD 2881). The company also markets other breeds such as blue based cross back arowana, golden based cross back arowana and red tail arowana. High prices were because of the significance of the fish as symbols of prosperity and wealth (www.everise-arowana.com)

The koi or Japanese carp and the discus continue to maintain its niche in the domestic market.

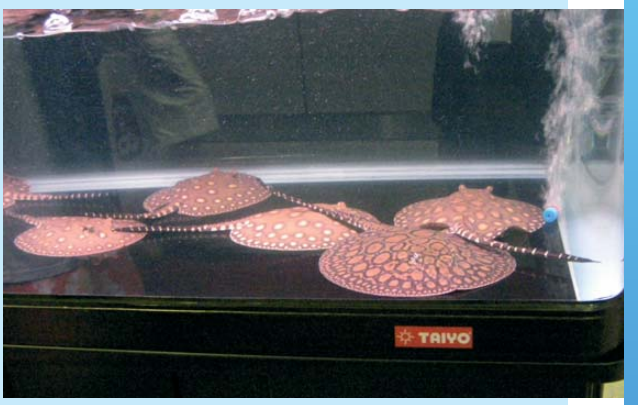
Malaysia's ornamental fish industry

The show is part of the overall plan to increase production of ornamental fish to 860 million tails by 2010. In 2007, the production was 679 million tails of ornamental fish valued at MYR192 million (USD 55.3 million). This is indeed a highly lucrative industry and has experienced the highest growth in the Malaysian agriculture sector at more than 40% over the past decade.

"Taking into consideration that the global demand estimated to be worth USD 4 billion annually for ornamental fish alone, excluding the related aquatic and services industry estimated at more than USD10 billion, there is tremendous potential for Malaysia to capture a larger slice of the global market. The main market for the ornamental fish is the European Union countries with 51%, of which the United Kingdom imports 19%, followed by Germany and France with 18% and 14% respectively. The remaining slice goes to Australia with 26% and Asian countries with a combined share of 20%", said the Minister of Agriculture and Agro-Based Industry in his opening speech.

"A pivotal move was the decision to allocate 49 Aquaculture Industry Zones (AIZs) and to provide the necessary infrastructure and support services for the development of the total aquaculture industry. These AIZs are expected to require RM2 billion (USD 576 million) in investments, local and foreign. The ministry has identified 30,000ha of land throughout the country for the AIZs", added the Minister.

In the current scenario, nurturing a domestic market is important. Among the strategies is to create night markets for ornamental fish trading.



The latest are these freshwater rays from brood stock imported from South America.

Uniqueness creates attention and brings in better prices as this arowan with a longer pelvic fin.

Food safety concerns at VIV Asia 2009

YeCherng enhances health

The biggest concern with regards to food consumption is food safety. YeCherng of Taiwan is committed to producing bio-secure and green products for quality feed for more than two decades. The company is dedicated to providing a total solution for safe and environmentally-friendly animal production.

One of the YeCherng's cutting-edge products is BioMeta, a drug-free and green feed ingredient for the enhancement of animal health and performance. BioMeta is produced by the symbiotic fermentation of multiple strains of beneficial microorganisms with soya protein and selected nutritional substrates. During the unique fermentation process, exclusive functional peptides and beneficial metabolites are generated. These functional compounds can greatly improve gut health by creating a superior environment for beneficial microorganisms in the gut of the animal. Furthermore, they have been proven to be anti pathogenic and stimulate the immune system. Finally, by using BioMeta, there will be an apparent health modulation and better feed efficiency and growth for animals.

The other innovative product is Attrax, which is a special attractant for both aquatic animals and livestock. It contains various amino acids, organic acids, natural taurine, betaine and Chinese herbal extracts. Those unique compounds can stimulate the diet gene to release NPY (Neuropeptide Y) in the brain. NPY is a 36 amino acid peptide neurotransmitter which can highly increase food intake for animals. As a result, by using Attrax, animals grow faster; thus reaching market size in a shorter period and feed waste can be greatly reduced. Moreover, greater feed conversion rates significantly bring down production costs and further reduce environmental pollution.

More information on these products will be available at the YeCherng booth No L033 at Aqua VIV Asia 2009 or visit their website at www.yecherng.com

Novus

Opens new Aqua Research Centre in Vietnam

The MOU was signed in March 2008 and on December 4, Novus Aqua Research Centre, located within the campus of Nong Lam University, Ho Chi Minh City, Vietnam was opened. This is the first model of collaboration between a company and university in Vietnam working together to develop products for a sustainable catfish and shrimp farming.

The centre was jointly opened by Dr. Nguyen Le Hung, Deputy Rector and Head of International Relations Office of Nong Lam University (second from right) and Thad Simons, CEO, Novus International (third from left). Others present were (from left), Dr. Pham Ngoc Minh, Deputy Director of the Southern Representative Office of Science and Technology Ministry, Dr. Farshad Shishehchian & Dr. Giovanni Gasperoni (Novus) and Dr. Pham Anh Tuan, Deputy Director of Science, Technology and Environment Department, Ministry of Agriculture and Rural Development.

The 1,000 m^2 and USD 0.5 million research facility centre includes 16 two-tonne experimental tanks and 150 small aquaria with recirculation water systems for the pangasius catfish, tilapia and shrimp, water analysis and microbiology laboratories and experimental feed processing laboratory with an 300kg/hr extruder. It has two fermenters of 500 litres and 50 litres.

Thad W Simons, President and CEO of Novus International, Inc, said, "This new research facility shows our commitment to the development of total management strategies in situ for industry in Asia, in particular for the catfish industry in Vietnam. This facility will be developed as a centre for excellence in aquaculture research in Vietnam to develop healthy, science based, innovative products and programs for the aquaculture market. This will work along similar lines as our multispecies R&D centre in China".

"The R&D team at Novus Aqua will work out of the centre and use this as the base to provide technical support to industry. Novus will share its own internal resources and research methodologies with researchers and students at Nong Lam. Initially, six research projects are envisaged to develop good management practices and increase value addition in pangasius and shrimp farming. This includes using our fermenter to develop probiotics ideal for conditions in catfish farming in Vietnam. In this industry, we need to work together to look closely at economics of feed and develop solutions to reduce production costs which are now just too high", said Dr Farshad Shishehchian, Global Aqua Manager.

Dr Craig Browdy, Senior Manager, Aquaculture Research sees this as a new step in developing industry in Vietnam. "We need to focus on a holistic approach to ensure sustainable practices, low impact on the environment and returns on investments. In feeds we will need to look at the efficiency of feed. The aim is the production of quality products using well managed operations."

Novus will also sponsor two post graduate students under the Novus Scholar Program to work in their laboratory in the US as well as in other collaborative laboratories. Nong Lam University has a student population of 16,000 and 37 fields of study. It offers postgraduate and undergraduate degrees in aquaculture, aquatic product processing and aquatic animal health management.

Novus International, Inc. is a global leader in animal health and nutrition with its headquarters in St. Louis, Missouri, USA. The main products include ALIMET® and MHA® feed supplements mainly for the animal feed industry. A recent success is with a new chelated mineral line which the company is looking at applications in aquaculture after the success in the equine and pet industry. In aquaculture, current products range from feed additives to probiotics. There are some 47-50 products including a new protease enzyme. Dr Giovanni Gasperoni, Vice President, Marketing & Sales stressed that Novus will not be product driven but market driven with the right combination of products to address the needs of customers such as in gut health and stress reduction.
For more information visit www.novusint.com.

USSEC- India

Second extrusion plant and freshwater cage culture

A second extrusion fish feed plant in India was opened by Uno Feeds in Komarada, Bhimavaram, West Godavari, Andhra Pradesh in September 2008. The company will market floating and sinking feeds for the catla, rohu, mrigal and pangasius catfish. In March 2008, the first large extrusion fish feed plant of the Indian Broiler Group was launched. With these plants, USSEC-US Soybean Export will aggressively market soy-based floating fish feed in India.

Dr. P. E. Vijay Anand, USSEC India Technical Director-Poultry, Livestock and Aquaculture said, "This is a unique marketing challenge to get the aqua feed industry to use soy in their feeds. Starting four years ago, with no soy-based feeds, there was much resistance and doubt as to whether this technology would take off in the Indian aquaculture industry. Through technical assistance and feeding demonstrations, USSEC proved to the aquaculture industry that this modern technology works."

Mr. G. Ramesh, Technical Manager-Aquaculture expects others feed mills to follow and create healthy competition to market more of these feeds. He has estimated that India will utilise 400,000 tonnes of extruded floating soy-based fish feed by 2010.

USSEC together with Indepesca, a major international marketing, processing and distribution company, launched a freshwater cage culture operation in central India. The council had earlier organized a visit to aquaculture operations in China for selected farmers. Subsequently, Indepesca installed 100 cages stocked with common carp and is sourcing soy-based fish feed from a USSEC recommended feed mill in India. Ramesh says that "creating new avenues is all about exposing the right business people to the right business technologies. This pilot project will include 1,000 cages by February 2009 and will eventually lead to a new feed mill to support the operations."
More information: web: www.ussoyexports.org.

GAA

BAP in shrimp pilot program

The US Food and Drug Administration has selected the Best Aquaculture Practices certification program (BAP) developed by the Global Aquaculture Alliance, to participate in Phase II of the Voluntary Third-Party Certification of imported farmed shrimp pilot program. This is a validation of the global organization's rigorous BAP certification as a path to enhanced food safety in the U.S. market, said GAA Executive Director Wally Stevens.

"We believe this pilot study holds great promise for increased food safety and could prove effective in helping the FDA enhance its existing efforts," Stevens said. "GAA also believes the results of the pilot will yield information that proves useful to other food industries."

He said what sets BAP certification apart from other systems in the pilot is that it covers all aspects of shrimp farming, from hatchery to processed lot, and also encompasses four major areas of concern: the environment, social justice, food safety and traceability. The standards are independently audited through the Aquaculture Certification Council in a comprehensive process that "creates and bolsters consumer confidence, not just in shrimp, but in other seafood products, as well."

Phase II of the pilot, which will allow FDA to identify technical issues related to assessing and processing certifications, will run through June 2009. During this period, the BAP program will introduce a new food safety verification process that complements existing facility inspections and traceability with final product testing.

Production quality certifications for China operations

The integrated aquaculture and aquatic product processing facilities of HQ Sustainable Maritime Industries, Inc, (HQS) in Hainan, China, has been certified by the British Retail Consortium (BRC) and the Ethical Trade Initiative (ETI). The BRC Global Standard and ETI "Base Code" certifications ensure that its tilapia and shrimp products are of the highest quality and are produced under ethically sound conditions prior to entering the distribution supply chain. The ETI "Base Code" certificate ensures that HQS takes responsibility for the labour and human rights practices within its supply chain.
More information: web: www.hqfish.com.

PT. Trouw Nutrition Indonesia

Regional office and moving

The company has announced that from January 1, 2009 the regional office has been transferred from Trouw Nutrition Hifeed B.V, Boxmeer, The Netherlands to PT. Trouw Nutrition Indonesia, Jakarta, Indonesia. All communication and administration will be coordinated from the Jakarta office. From 17 January, 2009 the office of PT Trouw Nutrition Indonesia will move to the following location: PT. Trouw Nutrition Indonesia, MM 2100 Industrial Town, Jl. Selayar Blok A3-2, Cikarang Barat, Bekasi 17845, Indonesia. Tel: +62-21-89983325, Fax: +62-21-89983326. More information: email: Fanny.Irawati@nutreco.com; Yofi.Fithri.Wahyuni@nutreco.com

Bentoli AgriNutrition
Accredited ISO 9001:2000 in Asia

The Singapore based speciality feed additives manufacturer Bentoli AgriNutrition Asia Pte Ltd was accredited ISO 9001:2000 for research, development and manufacturing of feed additives according to standards laid by United Kingdom Accreditation Services (UKAS).

This was conferred by the Certification International Singapore Pte Ltd after the final audit of Quality Management Systems of Bentoli AgriNutrition Asia Pte Ltd on October 22, 2008. The Executive Vice President, Dr Kasula Rajasekhar said, "We are proud, as a team, at this landmark achievement which is a result of our concerted, focused and committed efforts. This is a part of our aggressive plans to be one of the leading global speciality feed manufacturers and I heartily congratulate the Bentoli Asia team for the scheduled achievement of the same".

"This accreditation is a timely and distinctive recognition to our rapidly emerging operations in the eastern hemisphere", said President, John C Robinson. "It gives me immense pleasure and pride on this historical milestone of Bentoli Asia. This is yet another step demonstrating our commitment and focus to be the first choice strategic nutritional solution provider to our customers through our 'progressive nutritional concepts". More information: web: www.bentoli.com

Alltech
A stringent QC

Against a background of growing global concern for food safety, Alltech will focus on 'food safety for sustainability' and will provide information on the latest technologies and practices that can boost the safe and plentiful supply of food to the world.

"Food safety concerns pose a real threat to the feed industry and have serious implications for international trade, as well as consumer health. Alltech aims to achieve, and help our customers reach, the highest of standards in food safety with the overall aim of sustainably enhancing the reputation of our industry and consumer confidence," explained Vice-President for Asia-Pacific, Steve Bourne.

"All our products are subject to a stringent quality control procedure, AQS (Alltech Quality System), which incorporates standards set by all major regulatory bodies. Furthermore, our Bioplex® range of chelated trace minerals complies with a rigorous quality control program, Q+, whereby all batches are tested for Dioxin, PCBs and heavy metals. Presently we are the first and only company to have implemented such a programme in the feed industry. The 14 production facilities use this quality control system, so we can deliver the same high quality, safety and performance product to all end users throughout the world."

At Aqua VIV Asia 2009, Booth No A036, the Alltech FEI World Equestrian Games 2010™, the first ever title sponsor, will be featured. Visitors to the booth between 4-5pm can also take part in a daily happy hour. More information at www.alltech.com

AKVA group
Launches new website

This is a new and improved website, giving its customers an easier route to useful product specs as well as other important company information. The new features include expanded content, a new look and feel, as well as improved site navigation.

"Our online visitors will now experience a more complete and seamless view of Akva group online" says Trond Severinsen, Chief Marketing officer at Akva group. "The redesign of the website is not just a facelift! We have analysed the usability of the site, and the result is an intuitive and consistent web experience. It is now much easier for visitors to find the information they are looking for, whether it being in English or any of the other languages supported through translated product sheets. Further enhancements to the AKVA group website will be completed in the next few weeks, so please stay tuned". More information: Email: tseverinsen@akvagroup.com

Optical-based dissolved oxygen handheld

YSI has announced the launch of its new digital based ProODO (TM) optical dissolved oxygen handheld instrument. It is ideal for aquaculture use. The instrument fills a need for a rugged, versatile handheld optical dissolved oxygen instrument with powerful data management capabilities.

With field durable cables, MS-8 (military spec) connectors, rubber over molded IP-67 waterproof case, and graphic backlit display and keypad, the ProODO can meet any field challenge. Optical technology allows users to reduce or eliminate membrane changes, calibrations, stirring dependence and interferences. With the ruggedness, durable cables, feature set and desktop software, this handheld instrument is ideal for any aquaculture dissolved oxygen sampling application. The instrument has a rapid response time compared to similar technologies, saving time in the field.

The feature-packed instrument comes with YSI's Data Manager desktop software for real-time charting, instrument configuration, easy downloading and data management; a USB cable; and an innovative communication dock. For details: Email: proseries@YSI.com

AFNOR validation for PCR assays

Two new PCR assays from DuPont Qualicon have received the AFNOR certification as alternative methods for detecting *Listeria* and *Listeria* monocytogenes. These BAX® system 24E assays, developed in collaboration with Oxoid, Ltd., use optimized enrichment media to provide next-day test results from food and environmental samples. Afnor Certification is an internationally recognized European system that validates food testing methods according to the EN ISO 16140 protocol. The mark certifies that a multi-phase validation study by approved expert laboratories demonstrated equivalent results between the alternative test method and the traditional standardized method. This certification meets all the requirements of European regulation 2073/2005 relating to microbiological criteria applicable to food.

The BAX® system uses leading-edge technology, including polymerase chain reaction (PCR) assays, tableted reagents and optimized media, to detect *Salmonella, Listeria, Listeria monocytogenes, E. coli* O157:H7, *Enterobacter sakazakii, Campylobacter, Staphylococcus aureus* and yeast and mold. For information: www.qualicon.com

What to expect in AQUA CULTURE Asia Pacific Magazine in 2009

Vol 5 2009	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6
	January/ February	March/ April	May/ June	July/ August	September/ October	November/ December
Issue focus *current trends & challenges*	**Aqua Feed Production**	**Food Safety**	**Responsible and Sustainable Aquaculture**	**Health Management**	**Cage culture**	**Hatchery Management**
Industry review *with profiles & outlook*	Marine shrimp	Marine fish	Catfish	Freshwater prawn	Tilapia	Offshore cage culture
Shrimp/fish culture and developments	Features best practices and experiences from industry. Coverage on role models, benchmarking and breakthroughs in industry throughout the region					
Feed technology	Feed ingredients/ Additives	Extrusion technology/moist feeds/Ingredients	Feed regulations/ Organic feeds	Fish meal & oil replacements Novel meals	Feed processing/ Immunostimulants	Nutrition & formulation Larval feeds
Technical contributions	Certification & standards/ Disease management	Recirculation technology/ Fish/shrimp breeding programs	Hatchery management/ Pre and probiotics	Biosecurity/ Aeration technology	Fish diseases/ Biotechnology	Risk assessment/ Pond culture technology
Markets	Reports on opportunities, market trends, regulations and certifications, branding and product development					
Show preview/ issue	Aqua VIV Asia 2009, Bangkok 11-13 March	World Aquaculture 2009, Mexico 19-23 May	Vietfish 2009 Ho Chi Minh City 12-14 June		Asia Pacific Aquaculture 2009 Malaysia, TBA	Aquaculture China 2009 TBA

January 21-23
Indaqua 2009
Bhubaneswar, India
Email: premchandran@mpeda.nic.in, or bbsmpeda@dataone.in
Web: www.mpeda.com

February 1-6
Practical Short Course on Feeds & Pet Food Extrusion
Texas A&M University, USA
E-mail: mnriaz@tamu.edu
Web: www.tamu.edu/extrusion

February 15-18
Aquaculture America 2009
Seattle, Washington
Email: worldaqua@aol.com
Web: www.was.org

February 16-17
Aqua India 2008
Chennai, India
Email: aquaindia2008@gmail.com
Web: aquaprofessional.org

February 26-27
8th Practical Short Course: Aquafeed Platform - Aquaculture Feed Extrusion, Nutrition & Feed Formulation
Ghent, Belgium
Email: aquafeed@scarlet.be
Web: www.membraneworld.com

March 11-13
Aqua VIV Asia 2009
Bangkok, Thailand
Email: Steven Fockema Andreae steven.fockema@vnuexhibitions.com
Web: www.viv.net

March 25
Seminar on Fish Reproduction
Kuala Lumpur, Malaysia
Email: myfisoc@gmail.com
Web: www.vet.upm.edu.my/~mfs/

May 12-14
International Ocean Science, Technology and Policy Symposium and exhibition 2009 (WOC 09)
Manado, Indonesia
Email: info@woc2009.org
Web: www.woc2009.org

May 25-29
World Aquaculture 2009
Veracruz, Mexico
Email: worldaqua@aol.com
Web: www.was.org

June 12-14
Vietfish 2009- Vietnam Fisheries International Exhibition
Ho Chi Minh City
Email: quocthanh@vasep.com.vn
Web: www.vietfish.com.vn

July 5-7
Genomics in Aquaculture
Bodø, Norway
Web: www.gia2009.com

August 14-17
Aquaculture Europe 2009
Trondheim, Norway
Web: www.easonline.org

September 7-10
Larvi 2009-5th Fish & Shellfish Larviculture Symposium
Belgium
Email: larvi@ugent.be
Web: www.aquaculture.ugent.be

September 16-19
World Fishing Exhibition
Vigo, Spain
Email: IRoberts@mercatormedia.com
Web: www.worldfishingexhibition.com

November 2009
Asian-Pacific Aquaculture 2009
Malaysia
Email: worldaqua@aol.com
Web: www.was.org

December 9-12
4th Shanghai International Fisheries & Seafood Exposition
Shanghai, China PRC
Email: daniel@sifse.com
Web: www.sifse.com

2009

List your events in AQUA Culture AsiaPacific Magazine for FREE. Fax details to: +603 2096 2276 or email to the Editor at zuridah@aquaasiapac.com

Book Review

Study and analysis of feeds and fertilisers for sustainable aquaculture development

FAO Fisheries Technical Paper 497, 510 pages
Edited by Mohammad R Hasan, Thomas Hecht and Sena S de Silva
Published by FAO, Rome 2007
ISBN 978-92-5-105862-6

This is a comprehensive overview of feed usage for sustainable aquaculture in selected countries in Asia, Latin America and Africa, presented by experts led by Dr Mohamed Hasan FAO. The book starts with a global overview of feeds and synthesis of nutrients suitable for feeds by Dr AGJ Tacon and MR Hasan. He showed that 55% of global aquaculture depends on endogenous and exogenous feedings. The practices in Asia, ingredients and dependence on fish meal and ways forward were discussed by Dr Sena S de Silva and MR Hasan. The country reviews covered Bangladesh, China, India, Indonesia, Philippines, Thailand and Vietnam. A case study on feeding farm made feeds and pelleted commercial diets in the Mekong Delta was discussed by Dr Le Thanh Hung. Each of the country review provides information on the resources available as feeds in the specific country, often including the proximate analyses, practices in feed supply and management for the different aquaculture species, specifications and standards for some feeds, current feed usage and projections on feed consumption by species in the country. Overall the information in this compendium will be useful for the aqua feed industry interested in local ingredients and the market potential of shrimp and fish feed production.

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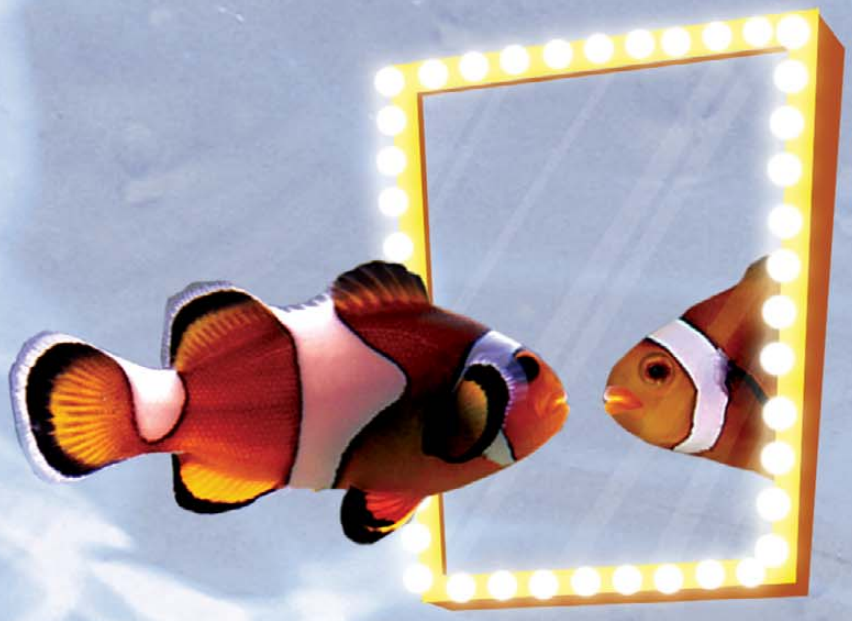

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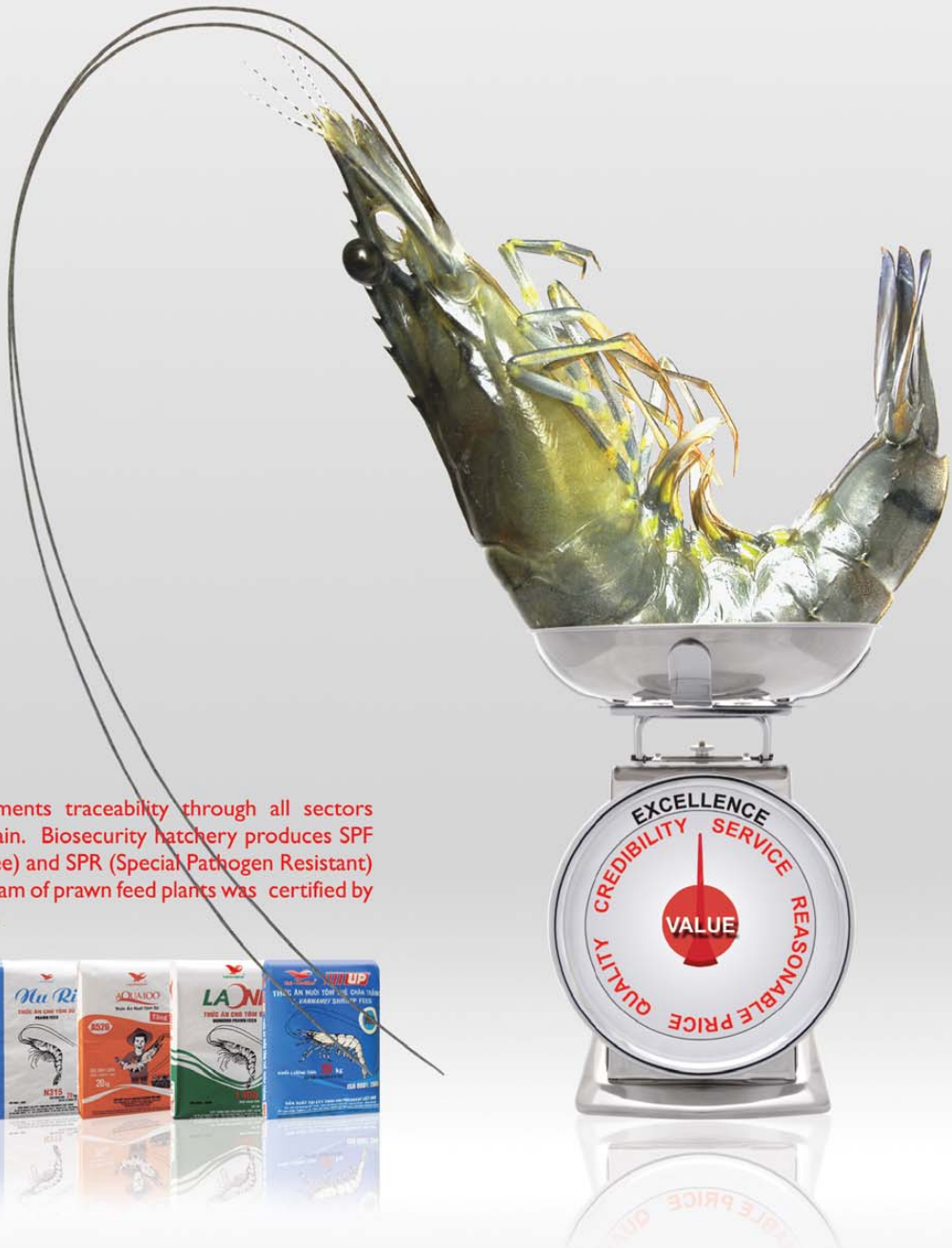

Uni-President implements traceability through all sectors along with supply chain. Biosecurity hatchery produces SPF (Special Pathogen Free) and SPR (Special Pathogen Resistant) larvae. Quality program of prawn feed plants was certified by ISO 22000 & HACCP.

• 16-18, DT 743, Song Than II Industrial Zone, Binh Duong, Vietnam.
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