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AQUA Culture AsiaPacific MAGAZINE

Regulating the white shrimp hatchery business in Thailand

At the 7th Asian Fisheries Forum 2004

Fish Breeding - the Taiwan model

Nucleotides for larval shrimp

Marine shrimp farming expands in Iran

World Aquaculture 2005
Bali, Indonesia

January/February 2005

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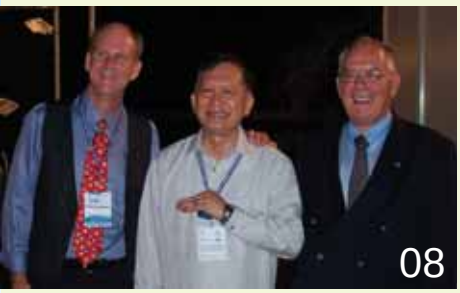

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WRITE TO THE EDITOR

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

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Letters may be edited prior to publication

On December 26, a tsunami hit many parts of the region. This affected our industry and its people causing economic losses. In this issue, we have some preliminary reports on the damages caused.

But importantly, we would like to express our deepest condolences and sympathy to all affected and for the lost of lives in this disaster.

From the editor

The year 2004 in review

Some Clarity But A Sad Ending

In the January/February 2004 issue of the Asian Aquaculture Magazine, where I was once the editor, I used "turning point" to describe the year 2003. Throughout 2004, you will agree that the same challenges continue to affect us. Perhaps, we can be more optimistic for 2005.

It was a pessimistic start to the year for the marine shrimp industry. On 20 January, the US Department of Commerce accepted the antidumping petition filed by the Southern Shrimp Alliance for shrimp imports from China, India, Thailand and Vietnam as well as Brazil and Ecuador. What was often not mentioned was the bearish outlook on the global commerce of the industry from larval feeds to aerators which followed. By December, it was better than expected with lower tariffs for all countries with the exception of China. Details on the latest decision on this matter are given in the news section. What was also clear from this was that the affected countries worked individually although faced by a single common threat.

Did this uncertainty affect production? Apparently not, as production from these countries continued on the upward trend. What they did was seek alternative markets. China exported more to South East Asia. Her access to the EU was possible in the third quarter when the 100% check on banned antibiotic residues was lifted. Vietnam redirected her shrimp exports to Japan, Korea, Philippines and Taiwan and exports to the US declined by 20% for the January-July period. Thailand's strategy was value added production. Thailand is also awaiting the EU decision to reduce the tariff rate of 12%.

As predicted, the culture of white shrimp, *Asian style* is fast expanding, particularly in Indonesia and Thailand. A major development for the region is the self regulation on the quality of imported specific pathogen free (SPF) broodstock and on postlarvae production in Thailand, both by the government and private sector. This is detailed in this issue. This is a plus point for the region and other countries should do well to learn from the Thai experience and emulate this program.

In the industry, many believe that shrimp has become a one commodity market whereas others are of the opinion that two segments for the marine shrimp have evolved viz white shrimp for small size pieces and the black tiger shrimp for larger pieces. CPF's Sujint Thammasart said that black tiger shrimp culture which dominate in India, Philippines, Malaysia, Vietnam and Mozambique, can be maintained if stocking densities are reduced. The initiation of several domestication programs in India, Malaysia and Hawaii and the successful commercialisation of disease free postlarvae (see Asian Aquaculture, issue Jan/Feb, 2004) in Thailand and Malaysia will help us achieve this in the long term. But the industry cannot wait as even Filipino farmers in the Visayas are switching to white shrimp culture which they were once adamant against.

Economic losses from diseases also dominated news. In September, FAO reported annual USD 25 million losses from diseases in Malaysia whilst Taura Syndrome Virus (TSV) has also emerged as a threat elsewhere. In Indonesia, suspected Koi Herpes Virus (KHV) caused more than USD 5.5 million of losses. Discoveries of diseases and other infections for the marine fish were further revealed at the recent Asian Fisheries Forum in Penang. Due to the lack of long term solutions, discussion groups focussed on ways of improving pond conditions, mainly through the use of probiotics, to reduce disease occurrences. The conclusion of experts, according to FAO statements, was that countries in Asia continue to lack the resources, expertise and infrastructure for monitoring and responding to outbreaks of aquatic animal diseases.

Food safety issues were emphasized throughout the year. Many countries introduced or expanded their "codes of conduct" and "farm to fork" quality programs so as not to lose out in export markets. Traceability issues were also introduced during the year though for many producers in Asia, it is still difficult to visualize its importance and long term impacts on markets.

Asian producers, across all sectors of the industry, must realise that this will become a standard characteristic for their produce.

We wish you all the best for the New Year

Zuridah Merican
Editor

How AQUA Culture AsiaPacific Magazine works for You, the reader

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Whether you are a hatchery operator, production manager or processor, you are most important to us. We know that you can move the industry forward if you have access to information and if you share your success with others.

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You, the industry specialist, have done the trials and research and wish the industry to learn from it. We will help you present these in an easy to read manner so that your research does not remain within the laboratory only. Email the editor for guidelines.

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Final duties in shrimp antidumping

In its final determinations, the US DOC has adjusted the preliminary determinations carried out in June and July, 2004. The country- wide rate has been reduced for five countries whilst that for China remains.

On 30 November, the Department of Commerce (DOC) announced the final duties for China and Vietnam. It stated, that "we find that, with the exception of one Chinese producer/exporter, Zhangjiang Guolian Aquatic Products Co., Ltd., Chinese and Vietnamese producers/exporters have sold frozen and canned warmwater shrimp in the U.S. market at less than fair value, with margins ranging from 27.89 to 112.81 % for imports from PR China and 4.13 to 25.76 % for imports from Vietnam.".

Although margins were reduced for the four respondents from China and unchanged for Zhangjiang Guolian Aquatic Products Co, the country-wide rate remains the same for China at 112.81%. However, this rate was reduced for Vietnam from 93.13% to 25.76%.

On December 20, when the final determinations were made for the remaining four countries, margins for companies were generally reduced. The Department imposed margins ranging from 9.69 to 67.80 % for Brazil, 2.35 to 4.48 % for Ecuador, 5.02 to 13.42 % for India, and 5.79 to 6.82 % for Thailand.

However, margins were unchanged for Brazil's Notre Pesca whereas they have been marginally increased for India's Nekkanti Seafoods Limited and the Rubicon group of Thailand.

Next is the final injury determinations to be made by the US International Trade Commission (ITC). For China and Vietnam, this is scheduled on or about January 12, 2005 and for the rest of the countries, it will be January 31, 2005.

If the ITC makes a final affirmative determination that imports are injuring the domestic industry, the Department will issue an antidumping duty order and will instruct U.S. Customs and Border Protection (Customs) to collect cash deposits on imports of subject merchandise. (details from http://www.ita.doc.gov/media/FactSheet/1204/shrimp_122004.html & http://www.trade.gov/media/FactSheet/1104/shrimp_113004.html)

Final on duties positive for Thailand

Thai shrimp exports will remain competitive despite the slight drop in their antidumping duties levied by the US, Thailand's largest shrimp importer.

In December, the US Department of Commerce (DOC) finalised the dumping duties for Thai shrimp. It lowered the range of duties on Thai shrimp exports to 5.79 to 6.82% from 5.56 to 10.25%.

"At this range of duties, we will gain advantage over other countries that export shrimp to the US," said Somsak Panitatayasai, President of the Thai Shrimp Association.

He said that even though Ecuador's shrimp exports to the US will be taxed lower at 3.26%, it will not influence the US market. He added that it will be difficult for Ecuador to increase its shrimp production beyond its current level of 40,000-50,000 tonnes/year.

Thailand does not consider India and Vietnam as competitors because they produce black tiger shrimp, while the main production of Thailand is white shrimp.

"We could significantly boost exports to the US by taking the share from China, which would be no longer competitive in the US market," said Mr. Panitatayasai.

Nevertheless, he expressed disappointment that the final duties for Thai shrimp exports to the US were not lower.

"This US ruling deviates from the fact. Had the Thai government exerted more efforts in informing the US, the final duties for Thai shrimp could be much lower."

The association estimated that Thai shrimp exports in 2004 will total to 240,000 tonnes worth about 75,000 million baht (USD 1,875 million), which is closely similar to that in 2003.

Duties of 9.45% for India

Though the rate in this final determination was less than the preliminary rate of 14.2%, the seafood industry in India has expressed concern at the higher cost and loss of competitiveness facing them.

In an interview with the Economic Times, Mr. G. Mohan Kumar, Chairman of The Marine products Export Development Authority (MPEDA) said that the final rates would not cause as much of a problem as was expected.

Although the lesser rate of duty for Vietnam and Thailand at 4.38% and 6.3% respectively will have an impact on the industry in India, Mr. Mohan is of the view that the difference in duties between India and Vietnam and Thailand is not so high as to cause a diversion of trade.

In the case of India, three companies have been imposed varying rates. Hindustani Lever Limited faces the highest duties of 13.42% whilst Devi Sea Foods Ltd has 5.02%. According to the import statistics in the US Department of Commerce fact sheet, US imports of shrimp from India totalled 45,082 tonnes in 2003. For the period Jan- September 2004, the volume was 33,484 tonnes (www.mpeda.com).

Punitive duties for Chinese shrimp

In several statements, the Chinese Ministry of Commerce criticized this decision. In Cappma News, it said, "The competitiveness of Chinese shrimp exports to the US comes from favorable weather conditions and relatively low labour costs." It added that according to this decision, 35 Chinese companies will pay an average of 55.23% while others will pay the China- wide rate of 112.81%.

Some Chinese companies have also complained that by using prices of inappropriate substitute countries in their investigations, the US has actually blocked Chinese shrimp exporters from doing normal business.

Jiang Mingkai, a manager from the Zhonglian Aquatic Product Co said to Xinhua Net, "If we sell at below cost prices or prices lower than in the domestic markets, we cannot make a profit".

An official from the Chinese shrimp industry said that if they sell at prices lower than American shrimp producers, it is because they have invested in modern technology for their shrimp farms and have lower labour costs.

The Chinese Ministry of Commerce now hopes that the ITC will give an objective and fair decision in January 2005.

Latest News

ITC says US shrimp industry injured by imports

January 6, 2005. The United States International Trade Commission (ITC) today announced that certain non-canned warm water shrimp and prawns from Brazil, China, Ecuador, India, Thailand, and Vietnam injure the US shrimp industry. With respect to canned warm water shrimp and prawns from China, Thailand, and Vietnam, they made negative determinations and thus no orders will be issued. They found that imports of canned warm water shrimp and prawns from Brazil, Ecuador, and India were negligible and investigations will end.

Citing concerns about the possible impact of the recent tsunami on the shrimp industry of Thailand and India, the Commission, announced that it will collect information and invite submissions on whether this will warrant a review of the injury determination.

Aftermath of the tsunami

Malaysia

The Malaysian Fisheries Department has made an assessment of the damages to the aquaculture industry in affected areas. Marine fish cage farmers in Telok Bahang and Pulau Betong, along the western coast of Penang Island were badly hit. They have lost all their stocks as cages were full of groupers (particularly the high value ones), seabass and other marine fish which were being cultured for the peak season in February (Chinese New Year). The estimated loss from the destruction of stocks and structures is more than RM13 million (USD 3.2 million). Cage farms in waters between the island and the mainland did not suffer any damage.

All of the traditional cages, oyster and mussel farms in Pantai Merdeka, off the coast of Kedah in the area were destroyed. In Langkawi, two pen culture farms were damaged. The larger mariculture activities located on the other side of the island were spared.

There was little damage to the National Prawn Breeding and Production Centre in Kota Kuala Muda, where some flooding was reported. However, the wave totally destroyed houses located close to the sea. Staff at the centre reported the loss of relatives.

According to its Director General of Fisheries, Datuk Junaidi Ayub, the damage to the fishing industry is more significant. Some 5,000 fisherman have lost their source of income, boats and equipment. This will take a longer to time to recover in comparison to the aquaculture industry.

India

In The Hindu, an assessment from the Aquaculture Authority, a regulatory body for shrimp farms in the country and from the All India Shrimp Hatcheries Group will be done soon. The preliminary report said that bunds of shrimp farms, machinery and infrastructure in hatcheries have been damaged. As no farming was carried on at that time, there was no loss to crops.

The authority also said that their main concern is for small farmers, who own land from 0.25 ha to 0.5 ha. This is important as 42% of shrimp farmers in Tamil Nadu (totalling 844) and 99% of farmers in Andhra Pradesh (72,502) are in this group.

Dr S.Vasudevan also sent in the following report on the damages. "In the Kovalam, Marakanam and Pondy belt of Tamil Nadu, several hatcheries lost their pump houses, fencing etc. In Poompukar area, several hatcheries were similarly affected. In Andhra Pradesh, most of the hatcheries were not much affected except in Thupilipalem in Nellore District where some damages have been reported. The hatcheries at Chirala, Bapatla, Kakinada and Vizag survived."

He added that shrimp farms in Cuddalore, Chidambaram and Sirkali were severely affected with damaged or collapsed bunds/ pumps. The intensity of damage was very severe in some farms as they also lost all of their culture stock. Shrimp farms in the Vellar estuaries were heavily damaged with inundated waters. Farms in Muthupet (ie mangrove area) were also water logged. Sea based farms in Tharangampadi, Vedaranyam, Nagapattinam, Velankanni were severely hit by the tsunami with no traces of bunds, motors and pumps.

Sadly there were also loss of lives of industry members. Mr.Vijayakumar, technical assistant at Muttukadu Hatchery of CIBA and Mr. Murugan, farm technician in Vedaranyam lost their lives. Missing were a few seafood processing workers employed in Aswini Cold Storage, Chennai who went to purchase shrimp in the Vedaranyam area.

As most of the fishing boats suffered heavy damages especially those in Pazhayar, Poompugar and Vanagiri area, the next crop season for shrimp culture will be delayed as these boats were used for shrimp broodstock collection.

"Although, it is expected that a priority will be given to these farms, stocking of seeds will be delayed as the farmers will need a long time to do the necessary work on their farms. It will also depend on how soon the hatcheries in Tamil Nadu complete their renovation work and also on the availability of broodstock". He said.

Sri Lanka

In Ampara district, a string of offshore fish hatcheries have been destroyed along the coast and an initial assessment of the damage by the Ceylon Fisheries Corporation put the figure at USD 200 million. The reconstruction of these hatcheries would take as long as one and half years to complete, according to the chairman Ceylon Fisheries Harbour Corporation, Tilakasiri Gallage in the Inter Press News Agency report.

Indonesia

From Indonesia, Yeo Keng Joon reported that friends from Gold Coin Aquaculture and Global Aquaculture are safe.

"Generally, prawn farms on the Aceh side of Sumatra have been wiped out. Ponds have been flooded, crops lost and people missing. It is a devastation, to put it mildly. It is also very depressing with lost lives, lost livelihoods, lost investments and in all very demoralising", he said.

"We expect the industry to be on a stand-still for a few weeks at least and realistically for a few months. No seafood processing, no farming. Unaffected hatcheries will have to slow down or stop production or look to moving their stock to unaffected farms in Java and beyond. Right now the mood is very sober and people are not in the mood to talk business. Even in areas which have not been affected by the tsunami, workers and farm hands in farms near to the sea-front are scared to go back; it will take time to heal the fear and paranoia. Owners and managers will have a tough time motivating their workers to get back to work. The continual broadcast of bad news on radio and TV does not help the industry".

"Farms on the Medan side of Sumatra and in Java are not affected. We are raising funds to help employees who have lost relatives".

For more updates on the situation, check the message board at http://www.aquafeed.com/phpBB2/viewforum.php?f=29

Minh Quan builds new fish feed mill in Vietnam

In November 2004, Minh Quan Co completed a new aquaculture feed mill in the southern province of Dong Thab, Vietnam.

Mr Vu Van Khanh (left) at the DSM conference with Le Nguyen Thuy

Mr Vu Van Khanh, Minh Quan's General Director, said the new plant has three lines, each with a capacity of 3 tonnes per hour of fish feeds. It will be utilised principally for producing catfish feeds. The machinery is from Triumph Engineering of Thailand.

"We have seen a growing demand for catfish feeds since the bird flu hit Vietnam. As a feed manufacturer, we don't want to miss an opportunity in taking some share in the catfish feed market," he said.

Mr Khanh founded Minh Quan in 2002 and built a livestock feedmill with a capacity of 12,000 tpm in Dong Nai province, outside Ho Chi Minh City. The new feedmill in Dong Thab is Minh Quan's second feedmill.

All the local and foreign-owned feedmills in South Vietnam are increasing capacity for fish feed production. This is to meet the demand for fish feeds as the demand for fish is on the increase. In Vietnam, catfish (basa and tra) are the more popular species.

Since the avian flu affected the poultry industry in Vietnam in early 2004, the Vietnamese have stayed away from eating chicken meat. They have also substituted chicken with pork, which then went up in price when feed costs increased. Fish became popular when there were rumours that pigs also carry the bird flu virus.

NILA JICA –a new tilapia strain

A new strain of tilapia called "Nila JICA" has been developed in Indonesia. This is a result of the collaborative work between the Center for Freshwater Aquaculture Development (BBAT) in Jambi and the Japan International Cooperation Agency (JICA).

Similar to the GIFT tilapia which was developed under a World Fish project in the Philippines, this new strain has better growth and other attributes as compared to the local strain of tilapia. The GIFT project developed a tilapia strain with 77% faster growth and 66% higher survival rates as compared to the strains being cultivated in the Philippines.

In a comparison of growth rates and other attributes between "Nila JICA" and the GIFT tilapia, the report said that the former has higher fecundity and higher growth rates. The number of eggs per female ranged from 1,000 eggs/160g to 4,100 eggs/560g female as compared to 1,050 eggs/250g of the GIFT tilapia female. At the grow out stage, percent body weight gain ranged from 2.8 to 4.5 per day as compared to 2.8% per day for the GIFT tilapia. It also has much higher growth rates at early larval stages. In contrast, the GIFT tilapia showed better feed conversion ratios, better hatching and survival rates at early larval stages.

The production of this new strain is timely as there are reports of mass mortalities of carp due to the Koi Herpes Virus (KHV). Thus, this new strain can be an alternative to the carp and alleviate the declines in freshwater fish production. In addition, the intensive culture of tilapia can be carried out in race way systems to achieve the export size of 500g per fish. (source: www.dkp.go.id)

Five day aquafarming courses

STAC- Sepang Today Aquaculture Center is a private aquafarming training centre for human resources development in aquaculture. Located in Malaysia, the centre will be organizing 5-day aquafarming courses for those who wish to upgrade and enhance their skills and knowledge in the aquafarming industries.

"Our mission is to train aquafarmers or investors in the right skill and technology. We have trained many local and foreign participants for the last 8 years. We know how to teach and train if that is what you are looking for. Aquafaming training and education is basically what we do best," said Chairman, Khoo Eng Wah.

Courses available at STAC are on the hatchery and farming of the marine prawn, marine fish, aquarium fish and seahorse, marine crab, Freshwater prawn *(Macrobrachium rosenbergii)* Cage and pond farming of tilapia, Arowana breeding and Bull frog and turtle breeding

For more information, contact: Khoo Eng Wah email: khoo@todayaqua.com; chansuet@tm.net.my; website: www.todayaqua.com

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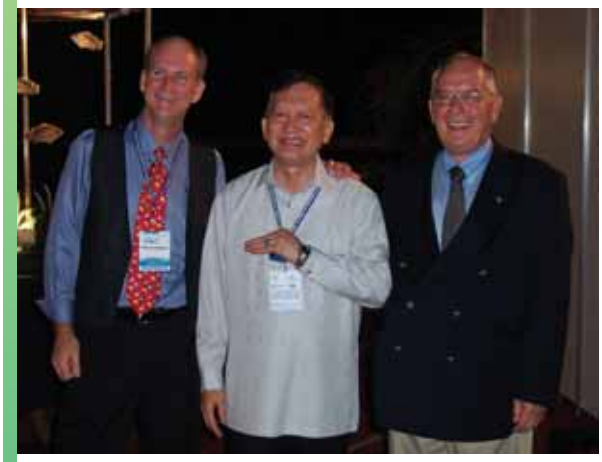
ISTA

The ISTA 6 conference held in Manila, Philippines, was widely hailed as the most successful symposium on tilapia aquaculture. By Kevin Fitzsimmons

Total attendance at the conference was almost 700 people from 40 countries. There were 80 oral presentations. More than 50% in attendance were female, to be expected considering the large number of women with professional training in aquaculture in the Philippines.



Dr Kevin Fitzsimmons and Mr Ben Heijne (Tilapia International Foundation President) presenting Dr Raphael Guerrero with a lifetime achievement award recognising his immense contributions to tilapia farming in the Philippines (Text and photo courtesy of Eric Roderick)

At the ISTA 6 trade show (photo courtesy of Eric Roderick)

One of the many ponds at BFAR showing the hapas used for genetic selection experiments. The white platform on the RHS pond was erected recently for the President of the Philippines (Gloria Arroyo) who visited BFAR for a symbolic release of new germplasm (Text and photo courtesy of Eric Roderick)

Keynote speakers were David Little from University of Stirling, Scotland (Delivering better quality tilapia seed to farmers) and Lai Qiu Ming and Yang Yi, Ocean University of Hainan and Asian Institute of Technology, respectively, (Tilapia culture in China). The conference hosted over 70 international delegates from more than 40 countries.

The Philippines Bureau of Fisheries and Aquatic Resources and the American Tilapia Association were the major sponsors of the meeting. Schering-Plough Aquaculture, the Aquaculture Collaborative Research Support Program and FYD International were the co-sponsors of ISTA 6. Other supporters of the conference included Taiwan Tilapia Alliance, Asian Institute of Technology, World Aquaculture Society, World Fish Center, Central Luzon State University and Feedmix Nutrition, Santeh Feeds, and TGA Farms.

During the opening address, Department of Agriculture Secretary, Arthur Yap, made two significant announcements. First, he described a new master plan supporting the development of a tilapia aquaculture park in Northern Mindanao. This park will produce tilapia products for international markets providing new employment and business opportunities in tilapia aquaculture.

Second, he announced that tilapia would be added to the standard "grocery basket" used by the government to determine costs of living and other economic data. This recognition of tilapia as one of the basic foods consumed by Filipinos on a daily basis helps cement its place as one of the most important food fish globally.

Dr Rafael Guerrero, the Filipino biologist who is widely considered to be one of the most influential scientists fostering the growth of tilapia aquaculture on a global basis, was honored with the John Heijne Memorial Award. This award is bestowed by the Tilapia International Foundation at the ISTA meetings, where lifetime achievements in support of tilapia aquaculture are honoured.

With the success of ISTA 6, there were many offers to host the next meeting. It was then decided to move the next ISTA up to the fall of 2006 in Guadalajara, Mexico. ISTA 7 will be sponsored by the government of Mexico, ATA, WAS, Aquaculture CRSP, WorldFish, Tilapia International Foundation, the US-AID Aquaculture TIES Program, Stirling Aquaculture and the Universities of Arizona, Tamaulipas and Tabasco.

Together with the conference was a heavily attended trade show. Field trips to tilapia production and processing centers at Lake Taal and Pampanga Province, research and development sites at the Science City of Munõz and supporting industries including feed mills, hatcheries and universities in Laguna and Nueva Ecija were also included.

Graham Mair, Flinders University, Australia and friends

Bangladesh: ethical and environmentally sound shrimp production

The Prime Minister of Bangladesh Begum Khaleda Zia has asked shrimp producers not to harm or degrade the environment when carrying out shrimp culture activities. She said that, "lessons could be learnt and experience taken from other countries to produce shrimp without harming the environment". She appreciated the wide popularity of Bangladesh shrimp in international markets but urged the exporters to maintain the momentum but with ethics and devotion.

This was said that at the inauguration of the First International Conference on Aquaculture Production and Marketing of Shrimp and Finfish and Bangladesh Seafood Expo 2004 on 28 November, 2004. This event was organized by the Bangladesh Frozen Foods Exporters Association (BFFEA) in collaboration with the Ministry of Fisheries and Livestock and INFOFISH. It attracted about 100 fishery experts and buyers from 20 countries and the public and private sectors. Thirty papers were presented. (News courtesy of BFFEA)

Prime Minister of Bangladesh Begum Khaleda Zia, accompanied by other ministers during the Bangladesh Seafood Expo 2004 (photos and captions courtesy of BFFEA)

Certified organic shrimp production

Swiss Import Promotion Program (SIPPO) will carry out organic shrimp aquaculture in Bangladesh. With the implementation of this project, organic shrimp farmers could earn a premium price of 25% over the normal price. The project will start in Munshigonj, Satkhira and then expanded in other areas of the shrimp culture districts in Bangladesh. SIPPO already has a similar project in Vietnam.

At a briefing, Mr Philippe Serene, SIPPO's Consultant said that, "Bangladesh has a huge potential for organic shrimp farming as it already has the prerequisites for certification. All the producers need is training and certification from experts to practice organic farming as is already done in Vietnam".

According to the Memorandum of Understanding (MOU) signed on 6 December 2004, between BFFEA and SIPPO, SIPPO will support the training the farmers and processors for producing this organic shrimp in addition to arranging for the necessary contracts for importation into Switzerland and the EU. (News courtesy of BFFEA)

The signing of the MOU by BFFEA President Quazi Monirul Haq and Thomas Sporrer, Project Manager of SIPPO. Also present were Juerg Casserini, Charge d'affaires of the Swiss Embassy in Dhaka; Md. Mokammel Hossain, Principal Scientific Officer of the Department of Fisheries; Oliver Muller, Senior Consultant, SIPPO; Mahmudul Hasan, Secretary General, BFFEA and Dr. Afatabuzzaman, President, National Shrimp Farmers Association (photos and captions courtesy of BFFEA)

Skretting links with NACA

NACA has announced a new sponsorship of the Asia-Pacific Marine Finfish Aquaculture Network by Skretting, Nutreco's global aquafeed division. This inaugural commercial sponsorship will support the further expansion of the communications and training programs of the network.

In announcing this initiative, Pedro Bueno, Director General of NACA, said that the new partnership with Skretting, brings together a major commercial fish feed supplier to collaborate in the development of this important and increasingly active marine finfish network.

We are delighted to join this initiativeî, said Craig Foster, Managing Director of Skretting's Australasian operations. "The valuable extension work in transferring knowledge and skills will help ensure the sustainable development of aquaculture in our region".

The Asia-Pacific Marine Finfish Aquaculture Network was established by NACA to foster the development of sustainable marine finfish aquaculture in the Asia-Pacific region. The network currently brings together researchers and industry from over 20 countries in Asia and the Pacific.

Skretting is the world leader in the production and supply of feed for salmon and trout, meeting 40% of global demand. Skretting in Australia manufactures high quality aquaculture feeds for fish hatcheries and fish farms.

More details from www.enaca.org/marinefish; www.skretting.com.au

A dedicated area for Thai exhibitors at VICTAM ASIA 2006

Henk van de Bunt, General Manager of Victam International has announced the launch of the next Victam Asia event to be held in Thailand. The international exhibition and conference(s) will once again be held at the Queen Sirikit National Convention Centre in Bangkok from 8 – 10 March 2006.

He said, "This event will differ from previous shows held in Bangkok as there is now going to be a dedicated exhibition area for Thai exhibitors. This special area will enable local exhibitors from the animal feed, petfood, aquafeed and rice and grain processing industries to present their products and services to both the Thai markets and also to the many visitors that attend the show from East Asia and further".

The section on aquafeed will feature ingredients & production technology, machinery, processing, packaging and finished feed products for finfish, crustacea & ornamentals.

Official support for the event will be from Thailand's Ministry of Agriculture & Co-Operatives, Department of Livestock Development, Department of Fisheries, the Thai Feed Mill Association and Chamber of Commerce. These organisations will be represented at the event and it is also anticipated that many of their members will also be exhibiting at the show.

Victam has also appointed a number of representatives throughout South East Asia to assist in the co-ordination of the event. These are listed on the Victam website – www.victam.com

New fish feedmill for Betagro

The Betagro Group, Thailand's leading broiler integrator will build a new fish feedmill in Thailand with a designed capacity of 6,000 tpm.

This move reflects a steady growth in fish consumption after the avian flu outbreaks that hit Thailand in 2004 deterred the Thais from consuming poultry.

Nopporn Vayuchote, Betagro's Executive Vice President - Business Development, admitted the changing consumer preferences towards fish.

"This would create a huge demand for fish and fish feeds as Thailand has a huge potential in fish farming," he said. "The fish market is growing very fast. This is encouraging cage culture in the public waters across the country."

Betagro has a dedicated fish feedmill in Bangkok's neighbouring province of Nakhon Pathom, producing 1,500 tpm of fish feeds in 2004. It also has a 800 tpm shrimp feedmill.

Although the new plant has a capacity of 6,000 tpm, the initial production would only be half of this. Dr Vayuchote also indicated that they will use an extruder from a renowned supplier in the US.

"Of course, the US machine is more expensive than the locally made one. But we're talking about a long term investment, and the quality and durable extruder is opted for this purpose," he said.

Zhejiang seeks new markets

Shrimp exports from China's Zhejiang province to the US have dropped 90% since April 2004. In August it dropped to zero. Exports to Japan and Korea have declined by 10 and 30% respectively. The loss is estimated at USD 30 million. The province has turned to other markets and has recorded increases in exports to Indonesia and Canada. (Cappma news)

South Korea fish stocks up

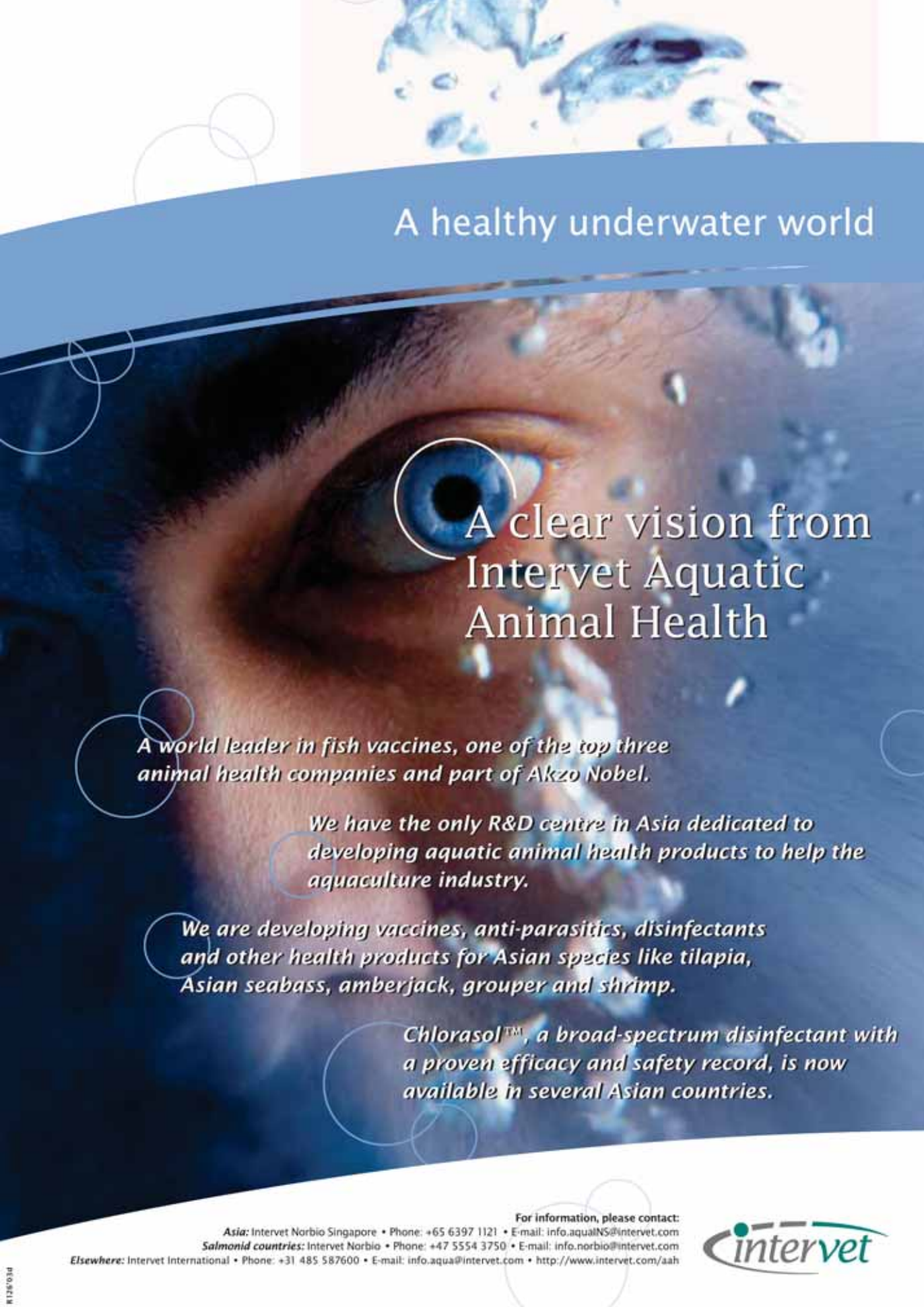
Following news of a suspected avian flu outbreak in South Korea, Bloomberg news reported that shares in South Korea's poultry shares dipped whilst shares in two fisheries companies surged on expectations that consumers will shun poultry. An analyst said that consumers may think that fish is safer compared to chicken at the moment. "There may be shifting of funds to fish,." He added.

New name for catfish

Vietnam's seafood industry has chosen the names "pangasius" and "basa pangasius" as the national brand names for its tra and basa catfish. This is to facilitate sales of the product in overseas markets. The new name was selected at a three-day seminar. The industry also established a trademark for catfish products, "Top-Quality Pangasius from Vietnam." Products with this brand name are required to meet all the strict standards and requirements of the international seafood market.

NZ to develop in sustainable way

New Zealand's aquaculture industry can now realise its potential with the passing of the Aquaculture Reform Bill. A moratorium on new consents for marine farms was placed in November 2001. The industry can now develop in a sustainable way. Maori interests in commercial marine farming space has also been addressed by providing, where possible, with 20% percent of marine farming space allocated since 1992 and 20% percent of any future new space.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Indonesia: six month ban on shrimp imports

On 31 December, the Jakarta Post said that the government has announced a six-month ban on shrimp imports from all countries starting December 28. It said that the move was made to protect the local industry and consumers from a suspected contamination from imported seafood.

The import ban, enacted through a joint decree signed by the Minister of Trade Mari E. Pangestu and Minister of Fisheries and Maritime Affairs Freddy Numberi, excludes shrimp for research purposes and those under imports contracts signed before Dec. 2.

Earlier, in a directive dated 20 December 2004, the Minister of Fisheries and Maritime Affairs said that it has stopped the imports of marine shrimp from six countries named in the US antidumping action, Thailand, China, India, Vietnam, Brazil and Ecuador. But this needed the approval of the Ministry of Trade to be effective.

The directive followed closely behind reports that a US team will be visiting Indonesia to ascertain whether Indonesia is importing shrimp from the four Asian countries and repackaging for export to the US. The team visit is scheduled for January -February 2005.

The representative of the Ministry of Trade, Halida Miljani also dismissed a suggestion that the measure was a way to prevent other producer countries from entering Indonesia's large market. He added that the measure would not spark retaliation from the producer countries, as it could be categorized as a "biosecurity move", which is allowed under the World Trade Organisation (WTO) regulation.

For the period from January to September 2004, US shrimp imports from Indonesia jumped 40 to 45% to 30,000 tonnes, in comparison to that in 2003 which totaled 23,000 tonnes. In 2002, imports from Indonesia totaled 17,000 tonnes.

Shrimp comprise 70% of the seafood exports of Indonesia, valued at USD 779 million. The Indonesia shrimp processing industry often has to import unprocessed shrimp. The country imported roughly 2,000 tonnes last year and 12,500 tonnes in the first 11 months of this year.

CPF expects sales to accelerate

Charoen Pokphand Foods (CPF) has forecasted that growth in sales will accelerate in 2005 because of increases shrimp exports.

To Bloomberg Asia, Chief Executive Adirek Sripratak said that sales in 2004 are forecasted to rise 8% to 90 billion baht (USD 2.3 billion). In 2005, sales may rise 11% to a record 100 billion baht (USD 2.6 billion) helped by rising shrimp exports.

After the US Department of Commerce lowered tariffs on Thailand's shrimp imports, U.S. buyers have began ordering shrimp from Thailand again, according to Mr Sripratak.

In addition, CPF also expects to sell more shrimp to the European Union next year. Thailand is awaiting the approval from the EU for a reduction in GSP rates for Thai shrimp. A decision may be completed by the end of March.

"The increase in shrimp farms will also increase our sales of feeds and baby shrimp." said Mr Sripratak.

"Sales of the company's domestic farmed shrimp may also rise over the next few months after the recent tsunamis damaged a significant portion of the nation's shrimp fleet in the Andaman Sea".

Processing plant for Kerpan

Malaysia's Kedah Aquaculture Sdn Bhd, has announced that it has invested RM10 million in a shrimp processing plant, scheduled for completion in 2005, according to a report in Star Online.

The plant will process shrimp produce by the company's shrimp rearing facility. Upon completion, the processing capacity will be 10 tonnes of shrimp daily and the products will be for export.

In the first quarter of the 2004, the farm harvested 900 tonnes from 226 ponds. In comparison, it produced 851 tonnes for the year 2003. Some 174 ponds are operated by farmers.

Suratthani goes white too

Once the stronghold of black tiger shrimp culture, farmers in Suratthani have also shifted to white shrimp culture similar to other production areas such as Nakhon Si Thammarat, Songkhla and Chanthaburi.

"Yields of white shrimp are now three or four times higher than those for black tiger shrimp. With that higher yield, we are quite sure to see 20% growth in next year's output," said Ekapoj Yodpinit, president of the Surat Thani Shrimp Club in a Bangkok Post news report in December.

They have shifted to white shrimp as yields are 1.8-2 tonnes per rai (11.25 -12.5 tonnes/ha) as compared to 600-700kg (3.8-4.4 tonnes/ha) with the black tiger shrimp. With the new breeding program for postlarvae production, they no longer need to depend on white shrimp breeding stock off the coast of Burma and Indonesia which were imported illegally.

There is no problem increasing output, even to 400,000 tonnes in 2005 but farmers are more concerned with whether the domestic markets can absorb this volume. The estimated production was 325,000 tonnes in 2004.

"This rise in output has encouraged us to push our government harder to make sure that we have more markets available to absorb soaring production," he said.

"Thai farmers have pinned their hopes on the EU restoring the GSP (generalised system of preferences) for shrimp imported from Thailand".

"We also expect a lower GSP rate from the EU, or at 4.2% for frozen and 7% for cooked products. With that rate, we could maintain the competitiveness of Thai shrimp in these two main markets," Mr Ekapoj said.

"It is aimed at not only protecting a 100-billion-baht-a-year business, but also the 1.5 million people working in the industry," he said. "Shrimp exporting is one of the few businesses in this country that depends on very high local content, as much as 85%," he added.

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"New Dimensions and Challenges"

Following tradition, the triennial meeting of the Asian Fisheries Society in Penang, Malaysia displayed the latest in Asian R&D in aquaculture and fisheries science. Additionally, there were discussions on problems and issues unique to aquaculture and fisheries in the region. It was the largest gathering of regional scientists since the forum began in Manila in 1986.

The meeting, organized by the Malaysian Fisheries Society (MFS), Department of Fisheries Malaysia and World Fish Center among others, and hosted by the University Science Malaysia (USM), attracted more than 600 participants. USM's Prof Roshada Hashim said that the success of the meeting was the culmination of the cooperation between several institutions and the support provided by the government of Malaysia.

The dominance of R&D shrimp and aquaculture biotechnology at the meeting was apparent with numerous presentations on molecular characterization of disease infections and on the biocontrol of bacterial pathogens and water quality. This showed the shift towards biotechnological advances to solve recurrent problems in shrimp aquaculture.

Prof Roshada Hashim, USM, Malaysia

Nevertheless, presentations on other aspects of aquaculture such as improving aquaculture productivity were also well attended. These dealt mainly with species of freshwater fish of importance to the respective countries and on the culture of the freshwater prawn (page 31).

Biotechnology in aquaculture

In introducing the subject, Dr Shaun M. Moss of the Oceanic Institute (OI) of Hawaii said that the use of biotechnology already has had a significant impact in shrimp aquaculture in recent years. He added that there is an expectation that it will play a larger role in the near future.

One of the more significant outcomes has been the use of captive stocks which has reached 88% recently as compared to only 20% in 1992 with the opportunity to benefit from improvement programs. On the microbial structure and functions in recirculating raceways used for intensive shrimp culture, Dr Moss said that by understanding the microbial process in shrimp ponds, it will be possible to manipulate carbon and nitrogen pathways and improve shrimp performance.

Shrimp genetics

Research on shrimp genetics, notably from scientists in Thailand, were directed at understanding the genetic expression of the black tiger shrimp for future selection programs and to derive strategies in health management. Centex Shrimp, Mahidol University presented findings from their ongoing research on the development of genetic markers as tools for the selection program of fast growing black tiger shrimp, gene expression in hematopoietic tissue and in yellow head virus glycoprotein gene and on how taura syndrome and other viruses respond at the molecular level.

Researchers from Chulangkorn University presented their work to isolate genetic markers in males and females in the giant freshwater prawn and sex specific expression in the black tiger shrimp. These were for a better understanding of maturation in captivity. They also studied the genetic diversity of the black tiger shrimp in Thailand, a necessity when the culture of offspring of different families are needed. Another study looked at the role of heat shock proteins in the stress response of the black tiger shrimp.

Biotec of the National Science and Technology Development Agency looked at genetic markers for the differentiation of larvae of *P. vannamei* and *P.merguiensis* and between the morphologically similar *P. monodon* and *P. semisulcatus*. Though still at a preliminary stage, molecular markers thus developed can prevent intentional supply of incorrect species.

Biotechnology in shrimp ponds

The synergy between biotechnology and animal husbandry was well covered by several ongoing research. Dr Idday Karunasagar from the University of Agricultural Sciences, Mangalore showed that bacteriophages from the natural environment can be useful in the biocontrol of pathogens. They have isolated several bacteriophages

From left, K. Subramaniam, Malaysia, Prof I. Chiu Liao and Dr Nai-Hsien Chao Liao, Taiwan

Team from Cambodia with Dr MC Nadeesha, India (extreme right)

lytic for luminous *Vibrio harveyi* strains which have the potential to control this group of shrimp pathogens.

Dr Tatsuya Nakayama from the University of Tsukuba said that one of the better methods to control mass mortality of shrimp in ponds is to control the virulence of prominent pathogenic bacteria such as Vibrio sp. In the special symposium, he showed that the addition of copper can control the luminescence of Vibrio without affecting cell growth.

Dr Pohan Panjaitan from the Northern Territory University, Australia adjusted the carbon: nitrogen ratio (C:N) from 6.5 to 22.5 by using molasses as an organic carbon source in zero water exchange *P. monodon* ponds. He concluded that better growth performance of shrimp and a better food conversion ratio was achieved because of better water quality (due to decreases in nitrite and carbon). Higher heterotrophic bacteria (17.4x109 ml/l) populations at higher C:N ratios occurred. As bacterial flocs serve as food for shrimp, FCR improved.

The control of ammonia and nitrite in commercial shrimp was demonstrated by using a recently developed consortium of microbial nitrification strains NB700, according to David Drahos of Novozymes (see page 36).

Finfish mariculture

The marine fish culture industry has expanded rapidly in recent years, according to Mike Rimmer of the Asia Pacific Marine Fish Network. The value stood at USD3.2 billion from I million tonnes with China and Japan contributing 58% and 27% of production respectively.

One dramatic development has been the hatchery production of groupers in Indonesia during the last five years from backyard hatcheries in Bali. The annual return for a grouper fry producer in Bali is around USD5,000. Most started with the production of milkfish and switched to grouper which is now in high demand.

However, diseases and the low usage of dry pellets, are constraints to the future development of the industry. Trash fish still remains a major feed in the grow out of marine fish. He cited the case in Indonesia where trash fish costs 1,000 to 2,000 Rp/kg and pellet feed costs 12,000 Rp/kg. Although FCR are 6:1 for the former and 1.7:1 for the latter, it still cost twice as much to produce fish fed on pellets. Thus, he urged that there should be more efforts to improve the cost effectiveness of pelleted feeds.

In the farming of cobia *Rachycentron canadum*, Taiwan's Dr Chen HY said that his preliminary work showed that cobia can effectively use diets where 40% of the fish meal was replaced with soybean meal without compromising growth. However, the soybean meal was treated to alter its flavour and chemical composition. He added that lupin meal, blood meal and canola meal are effective plant protein sources. This is one strategy towards a sustainable development of aquaculture.

Three groups of researchers reported on firsts in disease occurrences within the industry in Malaysia. Dr Leong Tak Seng and the Intervet group talked on the infection of the golden snapper with *Streptococcus inae* which they said was possibly linked to infections of monogeneans. Chuah Toh Thye from the National Prawn Research Centre in Kedah reported on the first occurrence of viral nervous necrosis in the red snapper. VNN screening of imports from Taiwan were carried out which when proved negative implied that there could be horizontal transmission from seabass.

The Animal Health group, Fisheries Research Institute, Penang have also isolated from diseased seabass and red drum, an iridovirus, as the causative agent for mass mortalities of cage fish. However, when the genome sequence was elucidated, they discovered that the causative virus was an ISKN virus (infectious spleen and kidney necrosis).

Improving productivity

In seed production, Suhairi Alimon from the Brackishwater Research Centre, Malaysia said that there was potential to use tanks for the breeding of tilapia. He reported an average of 40 larvae per day from a single brooder. Dr Fariduddin Othman looked at the population dynamics of zooplankton in a brackish water pond enriched with commercial probiotics, inert feed and yeast. He deduced that in the enrichment with the former two, the rapid multiplication of rotifers suppressed the growth of other zooplankton.

As a result of the technology to produce fast growing sterile common carps which was introduced in 2002, researchers at the University of Agricultural Sciences reported on the good growth performance of these carps. Its popularity is gaining and three private hatcheries have been established.

Nutritional studies which dominate this session covered investigations on enzyme profile of the *Catla catla* to analysis of the specific activity of proteases in mixed feeding schedules and replacement of fish meal with plant protein meals and nutrient requirements.

From Malaysia, Ghazali Ghapor, LKIM, Musa Brahim, Ministry of Agriculture, Sarawak and Peter Umak, State Farmers Association, Sarawak.

Team from the Philippines

Participation from the industry was small. Here the team from Feed company Dindings Soya and Multifeeds Sdn Bhd, Malaysia

Tenth DSM Nutritional Products Aquaculture Conference
SOURCING GLOBAL EXPERTISE TO MEET REGIONAL CHALLENGES

DSM Nutritional Products Aquaculture Centre Asia Pacific had planned that the 10th conference should meet demands of the current challenges. The conference attended by 200 participants, 34 of them from China, Indonesia, Japan, Korea, Taiwan and Vietnam, was held on November 25 in Bangkok, Thailand.

Dr Sirirat Rengpipat pictured with Dr Jirasak Tangtrongpiros, Chulalongkorn University.

From Indonesia to Korea
Drh Johannes R Irianto, DSM Indonesia, Jooho Hwang, Director R&D, Woosung Feed Co Ltd and Dr Jin Hyung Yoo, R&T General Manager Je Il Feed Co., Ltd.

Jacques Gabaudan, Manager of Aquaculture Centre Asia Pacific said that acting on feedback from the previous conferences; they have selected topics of practical relevance to the aquaculture industry and pool resources from Israel, Thailand, United Kingdom and the US.

In 2002, aquaculture consumed 46% of the 6.2 million tonnes of fish meal produced and by 2012, this amount will increase to 50% of the estimated production of 6 million tonnes. According to Dr Ian Pike from the International Fish meal and Fish Oil Organisation (IFFO), fish meal will continue to be a major ingredient in fish and shrimp starter diets although in grow out feeds, fish meal may be used more to compliment plant meals.

As developments in aquaculture continue to put pressure on the use of fish meal, Dr Chhorn Lim from the Aquatic Animal Health Research Unit, Auburn, USA told the audience that soybean meal and cotton seed meal are promising alternatives. Current commercial channel catfish feeds contain 40-50% soybean meal with 5-8% fish meal. Some feed manufacturers replaced fish meal with fish meal analogs (combination of animal by product meals).

New diets with the use of plant meals will require more information on chemoattractability in crustaceans and finfish. Dr Sheenaz Harper of the Ministry of Agriculture Israel gave some interesting insights into the behaviour of the freshwater prawn when presented with feed. He said that the sequence of responses by the prawn to betaine solution used as a chemoattractant are important criteria in the determination of attractability and palatability of feed. These are the flicking of the antennules followed by raising of the head and reorientation of the body.

On the use of probiotics in shrimp culture, Dr Sirirat Rengpipat of Chulalongkorn University of Thailand said that the Bacillus strain (S11) which they have isolated showed promising results. The work was started in 1998. In trials with shrimp in cages and in cement

Search for causes of MSG in Thailand

On the Monodon Slow Growth syndrome (MSG), Dr Boonsirm said that the Thai shrimp production has been affected by this unexplained syndrome since 2001. In affected ponds there was a 66% percent variation in growth as compared to the usual 20%. A large scale screening program revealed several viral pathogens as well as a microsporidian and bacterial infestations. Some 15% of ponds did not show any pathogens.

Work is still ongoing to determine the pathogen/s causing the syndrome. The group at Centex Shrimp has determined that the criteria for MSG is that growth is less than 0.12g/day at four months and the CV should be not less than 35%. They also have disregarded the theory that these were a result of genetic inbreeding as the phenomenon had manifested too quickly.

"It is believed that by screening off these viruses from domesticated bloodstocks and by avoiding the use of wild broodstocks that may harbour these viruses, this slow growth phenomenon can be gradually resolved", he said.

Dr Boonsirm Withyachumnarkul

From Vietnam- Hou Tsu Kuang, Uni-President, Huynh Man Khoi, DSM, Vietnam and Nguyen Quang Hien, Viet Thang Vietnam

ponds, there were improvements in survival to 81% for shrimp stocked at 40/m^2. This was compared to 63% in the non probiotic fed group. She also demonstrated the improvements in live weight and immune responses when shrimp were challenged with *Vibrio harveyi*.

Dr Boonsirm Withyachumnarkul, from Centex Shrimp, Mahidol University enlightened participants on the details and procedures involved in the development of specific pathogen free broodstock of black tiger shrimp. The domestication program has been ongoing for 9 years since 1996. The present generation has been commercialized albeit on a small scale. He went on to describe the facilities being developed as broodstock multiplication centres where broodstock from two selected families will be produced for distribution to hatcheries.

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The new concern is traceability of fish meal

"It is also important to understand that the value of fish meal is not just related to its freshness but that the purity of the fish meal must be maintained. Although the processing of the meal maybe under hygienic conditions, we would want to ensure that the meal does not pick up impurities after this", said Dr Ian Pike of IFFO. "This has become more important as by January 2005, the EU will demand the traceability of all raw materials".

This is specified under a new ruling (2003/126/EC). Even though fish do not carry the prions of BSE (as in land animal protein sources), there is concern that meat and bone meal can be mixed in fish meal. This was the reason why fish meal was not allowed into ruminant feed in the EU after the mad cow disease (BSE) debacle.

A revised microscopy test which has been tested in 25 laboratories is now the official method. It has an accuracy of 72% and will differentiate between mammalian and fish tissues. In the US, ELISA is used to detect animal protein at a limit of 1% and in Japan, DNA identification of land animal materials by PCR is being investigated.

Replacing fish meal with plant meals

On the use of soybean meal (SBM) and cotton seed meal (CSM) in fish and shrimp diets, Dr Chhorn Lim summarized some findings.

Dr Chhorn Lim

- SBM can replace 28% of the 40% of squid meal and fish meal in diets for *P. vannamei* shrimp. However, levels higher than 42% affected palatability.
- Hybrid tilapia fed 50% SBM in diets grew as well as fish fed 40% SBM diets containing 5% fish meal, according to work by the American Soybean Association in China.
- In red drum diets, 90% of fish meal can be replaced with SBM and 95% if attractants (2% glycine) are used. It is suggested that 5-10% of fish meal be maintained for palatability and attractability
- SBM can replaced 50% of fish meal in sea bass diets and two thirds of fish meal in milkfish diets
- Though palatable for *P. vannamei*, shrimp fed CSM diets develop yellow-green colouration
- In general, CSM can be added at 15% in diets for most freshwater fish.
- CSM is not genetically modified in comparison to many sources of SBM. On a protein basis, CSM is cheaper than SBM.
- However, the disadvantage of adding too much CSM is the wear and tear on the pellet dies due to the high levels of hulls in the meal

Iran expands marine shrimp farming

By Hassan Salehi

The spectacular rise in marine shrimp farming in Iran has been helped by Government plans to develop shrimp culture production, export, establish co-operatives and provide credit for farmers and related industries.

There has been a spectacular rise in the annual marine shrimp production from aquaculture. This rose from less than 5 tonnes in 1992 to more than 4,000 tonnes in 2000 and to 7,600 tonnes in 2003. More than 250 farms were operational in 2003 and in 2004, production is estimated at 9,000 tonnes from 307 farms.

Table 1. Annual shrimp farming production by provinces.

Province/Year	2000	2001	2002	2003	2004
Khuzestan	842	1800	0	30	26
Bushehr	1953	3500	3828	3700	5660
Hormozgan	855	1200	872	1750	2040
S- Blochestan	355	900	1300	2120	1274
Total	4005	7400	6000	7600	9000

The main shrimp farming areas from NW of the Persian Gulf to NE Gulf of Oman in Iran.

Presently, marine shrimp culture is concentrated along the coastal areas of the Persian Gulf and the Gulf of Oman, including Khuzestan, Bushehr, Hormozgan and Sistan-Baluchestan provinces. Here conditions are harsh with infertile and alkaline soils. Salinity can increase to 47-50 ppt in the ponds and air temperature reaches 50°C. The marine shrimp not only survive but also seem to thrive very well.

In 2003, the culture area totalled more than 3,600ha. This increased to almost 4,100ha by 2004. Some 45,000ha has been approved for the construction of farms and of this 7,000 and 8,800ha were constructed in 2003 and 2004 respectively.

However, the potential of shrimp culture in Iran could be constrained by market demand and producer profitability. Since 2001, farm gate prices of marine shrimp have declined almost 40%. In the case of 71-80 size, prices have declined from USD 3.5 in 1996 to USD 2.5 in 2002. Arising from this, some companies have given up on its culture.

Production techniques

More than 97% of production in 2003 was of the endemic *P. indicus*. The species is cultured in all coastal provinces. *P.semisulcatus* is cultured in Bushehr and Khuzestan provinces whereas *P.merguiensis* is mostly distributed in western areas of Hormozgan province. The black tiger shrimp *P.monodon* was imported for improvement of shrimp farming during 1992 to 1993 and during 2001 to 2003.

Production is mainly from semi-intensive systems, based on Thai and Filipino technologies. Ponds are rectangular with a surface area of 0.75 to 1.3 ha. Stocking density is about 22-25 PI/m^2.

In 2002, the average size of individual shrimp harvested ranged from 12 to 14g and by 2003 and 2004, this has increased to 13 to 16g.

Almost 75% are packed head-on for the Spanish and French market.

Pond productivity has been on the increase too. Currently some farmers have reported more than 4.5 tonnes/ha, above the target production levels of 3 tonnes/ha/crop. This is in contrast to production levels which averaged 1.37 tonnes/ha in 1999 and increasing to 1.64 tonnes/ha in 2000. In 2001, the average production rose to 2.3 tonnes/ha.

In 2003, 35 Iranian shrimp hatcheries produced more than 700 million PL15. This increased to more than 1,000 million PL15 by 2004. Almost all of them produce *P. indicus* using wild and pond reared brood stock.

Farm management

Due to climatic conditions, most farms produce only one crop per year with a gap of 5-6 months. Most have pumping systems to draw water from the main supply canal to a reservoir or directly to the secondary supply canals. Water passes through screens to prevent the entry of unwanted organisms.

The average water depth in ponds range from 1.4 to 1.6 m. The daily water exchange is 10-20% of the volume. Discharge of effluent into a central drainage canal is common. The main drainage canal is very long (usually 5-7 km), and ponds are designed so that effluents meet seawater 4-8 km from the entrance of the supply canal. Salinity ranges from 37-42 ppt in the supply canals.

Survival rates in such farms are low, averaging 60-70% in 2002, attributed to low water quality and also improper handling of postlarvae. More than 50% of the farms use aeration and paddlewheel aerators are common. These are manufactured locally. Two aerators with 16 propellers (8 propellers in each arm and 5.5 hp petrol engines) provide aeration for two adjacent ponds. Electric powered short-arm paddlewheel units are not common.

Shrimp production costs vary by provinces and farms and by 2002 and 2003 costs of production averaged USD 2.8. However, it is expected that this might be reduced to USD 2.5 in Bushehr province by 2004. Since 1999 food conversion ratios (FCR) were improved and from 2.1:1 in 1999 to almost 1.5:1 during the 2002-2004 period.

Shrimp buyers normally dispatch their own harvesting teams to the farms to supervise and organise harvesting procedures. Buyers are usually associated with processing plants. To reduce risks of black head, farmers stop feeding 12-24 hours before harvest. More than 95% of cultured shrimp are exported and almost 75% are packed head-on for the European market, mainly to Spain and France.

Feed production

In 2003, 6 feed mill plants with a capacity of more than 20,000 tonnes produced 10,000 tonnes of feed and more than 1,000 tonnes were also imported from Taiwan. In 2004, feed production increased to almost 11,000 tonnes but 3,000 tonnes were also imported from Taiwan and China.

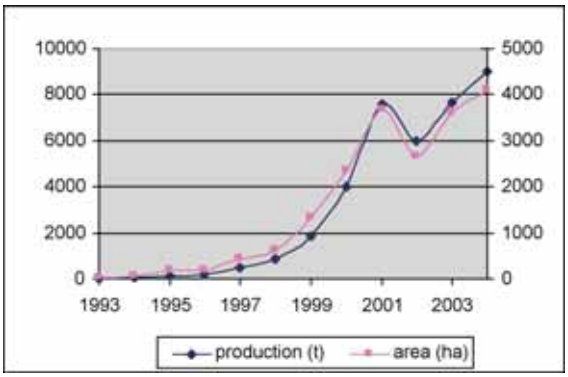
Future outlook

Market development, value-added products, expanded vertical integrated systems and improving farm management have been identified as the main strategies for the future development of the industry in Iran. For sustainable farm operations, impact on the environment, such as monitoring of discharge water and construction of sedimentation or bio-filtration ponds within the farm areas must be included. Laboratories to closely monitor shrimp farming activities and to focus on disease and quality control are also critical.

To move forward, the industry must improve on its applied R&D as well as the technical capability of farmers in shrimp culture. At present, this lack of understanding on the technical aspects of shrimp culture has created problems and a high potential risk for sustainable development in the coming years.

Currently, *P. indicus* is the main commercial species but for a rapidly expanding industry, the plan should include a diversification to other local and exotic species.

The area and production of shrimp farming expansion over the 1993-2004 in Iran.



Dr Salehi

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Self regulation in the white shrimp hatchery business of Thailand

As it goes full steam ahead into white shrimp production, the government and the hatchery industry in Thailand have come together to assure the quality of postlarvae. The Government controls the quality and quantity of broodstock imported into the country and hatchery operators must embark on a domestication program for the future. By Zuridah Merican

How it started

Two years ago, Thailand began to culture the white shrimp *Penaeus vannamei*. A limited number of specific pathogen free (SPF) broodstock were allowed into the country with permits given to selected groups and companies by the Department of Fisheries (DOF). Worried about diseases associated with the species, the department then stopped imports in 2003.

As farmers struggled with the culture of the black tiger shrimp, the push to culture white shrimp accelerated. White shrimp farming continued with existing stocks in the country although the quality of the seed stock had deteriorated. Production of the white shrimp increased to 175,000 tonnes in 2003 as compared to 155,000 tonnes for the black tiger shrimp in 2003 (Tookwinas, 2004). The proportion of this shrimp rose to 60% of total production which the department estimated will rise to 70% in 2004. (In contrast, industry sources estimate this to be 90%).

Problems in black tiger shrimp production were exacerbated with the onset of Monodon Stunted Growth syndrome (MSG). In 2004, urged by the industry, DOF opened the import of SPF broodstocks but with certain requirements. Only hatcheries that meet the requirements for GAP (Good Aquaculture Practices) and CoC (Code of Conduct) of the department and are able to run domestication programs as the next step, are eligible to import broodstock.

As for suppliers, DOF will check on site the status of selected producers of SPF shrimp. They must be certified as SPF shrimp producers by the local authorities. For example, the US Department of Agriculture (USDA) will certify those based in Hawaii. It does not stop here as for every consignment of broodstock, the department carries out random sampling to ensure that the imported stocks are free from WSSV, YHV, IHHNV and TSV.

"Our duty is to service the farmers. Therefore, we have worked with the industry to allow them to import stocks but we have stringent rules that only certified SPF stocks are brought in. Here we are helped by the strict control of the USDA on the industry in the US", said Dr Siri Tookwinas, Senior Expert, DOF.

To date the DOF has allowed imports from 4 farms in Hawaii and Florida, according to Dr Tookwinas. These are High Health Aquaculture, Kona Bay Marine Resources, SyAqua, all from Hawaii and Shrimp Improvement Systems from Florida. Another four or more will be certified in the near future. In Thailand, 12 hatcheries have been approved to import whereas the applications of 4 more are still pending.

Glen Illing, Managing Director of SyAqua Siam Co Ltd., the Thailand based aquaculture company of Sygen International, said, "DOF has a great control of the situation. With the GAP and CoC programs in place, the department can assure the professionalism of operations as well as the maintenance of their biosecurity status".

The next step

As the demand for broodstock in Thailand is large, the objective of the department is to encourage the development of local broodstock production .

"The local environment plays such an important role in gene expression", according to Mr Illing. "Therefore to obtain the maximum benefits, it is appropriate that broodstock production is carried under the same culture conditions".

He added, "It is inevitable that local broodstock production will develop. And under the watchful eye of the DOF, the health of these broodstock can be certified. But the quality and ultimate performance of local broodstock will be dependent on the breeding programs of genetic companies working within DOF guidelines"

Part of the DOF program is that all hatcheries must have a breeding program. "We have provided the choice to farmers. Our requirement is

that they keep 10% of offspring for future breeding work", said Dr Tookwinas.

However, the complexity of a breeding program may vary. Simple programs may just involve a selection for best growth or just the maintenance of the current lines. For a local company, the reproducibility of the first stock may wane with time and new stocks will be required

"What the DoF has done is to level the playing field with small and large producers but in reality, large companies that have large stocks and complex breeding programs will have an advantage of being able to work with larger populations and therefore, with high selection pressure, they will be able to achieve a faster rate of genetic improvement", said Mr Illing.

In the case of SyAqua, they are looking at the optimum genetic improvement to generate new lines that perform demonstrably better in the characteristics they are selecting for in that particular line. To develop these, large numbers of shrimp are required. This meant that new stock needed to be imported from their long running breeding program in Hawaii, to obtain the genetic diversity required for their line development. The aim is to generate 360 families in Thailand. The lines developed from these families are then crossed to produce the end product with the characteristics both the shrimp farmer and the shrimp processor require.

In their breeding programs, they combine technologies of quantitative genetics and molecular biology. In the former, they use economic factors such as the selection for growth rate,feed conversion efficiency, survivability etc. The best are selected and taking into account environmental differences, these are then used to produce the next generation and so forth. In the latter, they identify why certain animals perform better than others by looking at the gene sequences. Then they identify the sequences responsible, develop markers and screen out shrimp that do not carry the particular sequence of genes. The objective is to create a more homogenous population for particular characteristics.

Trials to asses the tolerance for diseases are conducted in locations away from production centres to ensure the biosecurity of production units. Shrimp from different families are fed infected material. Those families that exhibit tolerance to the diseases being investigated (such as WSSV and TSV) are then placed in the breeding program. From DNA samples of tolerant and susceptible shrimp, the correlation between the gene sequences is assessed and markers are derived.

It does not end here. "Whatever, the aspirations of the shrimp industry, we will work towards their needs", said Mr Illing. "The idea is make shrimp farming more profitable".

He said that this is achieved by reducing per unit costs of production, for example by improving feed efficiencies, survival rates or by increasing the growth rates. It can also be achieved by improving the value of the product by increasing harvest size, both in terms of count per kilogram and tonnage per pond.

"SyAqua is also working on increasing the value of shrimp products for the processing sector by developing lines that have improved meat quality characteristics such as a higher percentage of tail meat, redder colouration, other meat quality traits and overall a more homogenous shrimp".

Reference: Siri Tookwinas, 2004. Shrimp farming in Thailand: Environmental Management System and Action plan for Development.

What they say

Dr Siri Tookwinas, Senior Expert, DOF

"We have provided this choice to farmers as the problems encountered with the culture of the black tiger is continuing. Even in Suratthani, farmers have switched to farming white shrimp. Very few can produce large black tigers. Also, we have begun to look at shrimp as a commodity to be used in the processing of value added products where there is no species differentiation".

"The advantage of this is that we have started a broodstock development program in the country. The demand for broodstock in Thailand is huge. To date only 14,000 of the 70,000 broodstock required have been imported. Possibly, even Hawaiian suppliers cannot meet this demand. We have also begun to export postlarvae of white shrimp to the region".

"This will also help in our traceability for aquaculture products which was initiated in 2002. Seed stock will be issued fry movement documents (FMD) by the provincial fisheries office and when harvested, the movement document (MD) is issued for raw products before being marketed or processed".

Dr Sujint Thammasart, Senior Vice President, CPF

"These protocols, though stringent are important as the foundation of a white shrimp domestication program in Thailand. What this means is that for a Thai hatchery to qualify, they need to have adequate facilities. In many instances, the supplier (ie exporter) provides the technical assistance and training".

"As the first company to be involved in genetic selection of both species of the marine shrimp, we are now using the same method to develop selective lines for the black tiger shrimp. The culture of this shrimp is dominant in India, Philippines, Malaysia, Vietnam and Mozambique".

"In Thailand, farmers are keen to culture the white shrimp where harvests reach 10-12tonnes/ha. In the culture of the black tiger shrimp, we find it difficult to change the mindset of Thai farmers used to stocking high densities. This is despite the fact that larger shrimp sell at 20-30 Baht more than white shrimp. Here farmers culture at 40-50pcs/m^2 and produce only 16-20g animals but in contrast, India and the Philippines produce larger shrimp. In India, survival is 80% at a stocking density of 7pcs/m^2 in and in the Philippines, survival is 70% at 15-20 pcs/m^2".

Glen Illing, Managing Director, SyAqua Siam

"Appropriately, farmers wanted to continue the culture of the white shrimp and get the same yields as before and the Department wanted to help them. However, the term SPF (specific pathogen free) or SPR (specific pathogen resistant) conveys a certain mystique to farmers. It must be understood that on leaving the source facility, broodstock shrimp become exposed to several pathogens and therefore farmers still need to maintain a high biosecurity system to minimize disease risks".

"In the case of SPR shrimp, these claims may result from the shrimp or family having been challenged with the respective pathogen and just survived. Shrimp which survive a dirty environment could be more dangerous as they may be carriers of the pathogen. A lot of work is being done on identifying the gene sequences that result in tolerance or resistance to viruses. This work is in the early stages".

"I would caution farmers to be careful with claims of SPR shrimp. The proof is in the performance. Viruses mutate very easily and resistance to a certain strain of virus today may not mean the same tomorrow".

"I hope that DOF will educate, implement and police a program where they accredit farms a SPF status in Thailand. This will help remove the mystique and prevent leading farmers into a false sense of security on health issues. More importantly, it is the health assurance programs and biosecurity of the postlarva source facility, the distribution network and the shrimp farms themselves that will ensure Thai shrimp farms continue to produce high quality shrimp with minimum disruption from diseases".

White shrimp dominates Thailand


Pinyo Kiatpinyo with postlarvae

Thailand could become a net producer of white shrimp *Penaeus vannamei* in 2005 as the black tiger shrimp *(P. monodon)* is no longer competitive, even at higher selling prices, said Pinyo Kiatpinyo, President of The Thai White Shrimp Association.

"The share of white shrimp production in Thailand has reached 90% (as of December 2004). We have come to this level faster than previously thought".

Thailand's shrimp production is estimated to increase 20% in 2005 to about 400,000 tonnes and 90% of which would be the white shrimp. And Mr Pinyo estimates that the ratio of white shrimp in 2005 would even be higher to almost 100%.

The tiger shrimp production has a higher cost of production. "Even though the price of black tiger shrimp is higher than the white shrimp by about 20 baht/kg (for 50 pieces/kg shrimp), your profit is less than farming the white shrimp to that size," he said.

It is the lower production cost and high survival rate at high density stocking that is pushing for a rapid expansion of white shrimp production. This is boosting demand for white shrimp postlarvae, which is expected to reach 700 million postlarvae/year.

Mr Pinyo also estimated that Thailand's two largest producers of white shrimp postlarvae could have up to 50% market share and the other half will be shared by medium-sized hatcheries.

Sarin moves to white shrimp postlarvae production


Atthapol Suriyawonghae

Thailand's Sarin Hatchery Group plans to import 5,000 pairs of white shrimp *(P. vannamei)* brood stock in 2005.

The first shipment of 1,200 pairs of specific pathogen free (SPF) white shrimp broodstock from Hawaii's Kona Bay Marine Resources arrived in October 2004. These will be used to produce quality white shrimp postlarvae for the Thai shrimp industry, which is switching almost entirely to white shrimp from black tiger shrimp culture.

Certified under the government's code of practice for hatchery practices, Sarin Hatchery is a major postlarvae producer in Thailand. There are eight hatcheries under the Sarin Hatchery Group, all located on the Andaman Sea coast in Thailand's southern province of Phuket.

"We plan to import a total of 5,000 pairs of the white shrimp broodstock from Kona Bay Resources in Hawaii," said Atthapol Suriyawonghae, Sarin Hatchery's Managing Director.

Currently, Sarin has completely switched to white shrimp after years of producing black tiger shrimp postlarvae. Mr Attapol said that the demand for white shrimp postlarvae is on the increase because farmers can profit more from its culture as compared to that of black tiger shrimp. In addition, the Monodon Stunted Growth syndrome is affecting many ponds.


P. vannamei broodstock (Courtesy of Brian Goldstein, Kona Bay Marine Resources) Hawaii)

"Even shrimp farmers in the southern province of Suratthani, who used to oppose strongly the culture of white shrimp, have changed to white shrimp culture".

He added that Hawaii and Florida will be the main source of white shrimp boodstock for Thailand as its offspring outperforms those derived from the other sources. Therefore, he said, the white shrimp postlarvae from broodstock of US origin is sold at 0.10-0.12 baht/piece for postlarvae 10-12. The price of white shrimp in Thailand varies from 0.04 to 0.14 baht/piece.

Mr Atthapol believes that the quality of white shrimp postlarvae in Thailand will improve after the government lifted a ban on the import of broodstock and imposed certain conditions on both importers and exporters.

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Marine fish hatchery production – the Taiwan model

Taiwan pioneered marine finfish breeding techniques more than 30 years ago and continues to lead in the field. However, this lead is being threatened by lower costs of production and refined techniques being developed elsewhere in the region. To be ahead, its producers must adapt and innovate. This paper uses the SWOT analysis to look at reasons for its success and problems as well as the future direction and strategies. By Huei Meei Su*

Taiwan's marine fish hatchery grew rapidly after its initial success with the breeding of the grey mullet *Mugil cephalus* in 1969. Currently, the breeding of 67 species have been commercialised. Among the groupers, the breeding of the Malabar grouper was achieved in 1982 and followed by the coioides grouper, tiger grouper and giant grouper in 1986, 1996 and 1997, respectively (Table 1). In 2003, production of fish fry totaled 1 billion pieces valued at USD23 million.

Table 1: Species rearing in recent years according to demand level.

Name	Local/ export	Year of breeding success
Large demand		
Milkfish, *Chanos chanos*	pond	1978
Giant seaperch, *Lates japonicus*	pond	1986
Orange spotted grouper, *Epinephelus coioides*	pond	1986
Tiger grouper, *Epinephelus fuscoguttatus*	Cage/export	1996
Giant Grouper, *Epinephelus lanceolatus*	pond	1997
Cobia, *Rachycentron canadum*	cage	1994
Four finger threadfin, *Eleutheronema tetradactylum*	pond	1996
Common slipmouth, *Leiognathus equulus*	pond	1998
Small demand		
Grey mullet, *Mugil cephalus*	pond	1969
Black seabream, *Acanthopagrus schlegeli*	pond	1979
Three stripped tiger fish, *Therapon jarbua*	pond	1989
Red drum, *Sciaenops ocellatus*	pond	1991
Round batfish, *Platax orbucularis*	pond	1994
Replaced by China in 2004		
Long dorsal fin, *Trachinotus blochii*	pond	1989
Short dorsal fin, *Trachinotus ovatus*	Cage/export	1997
Pink snapper, *Lutjanus erythropterus*	Pond/cage	1998
Seba snapper, *Lutjanus sebas*	Cage/export	1998

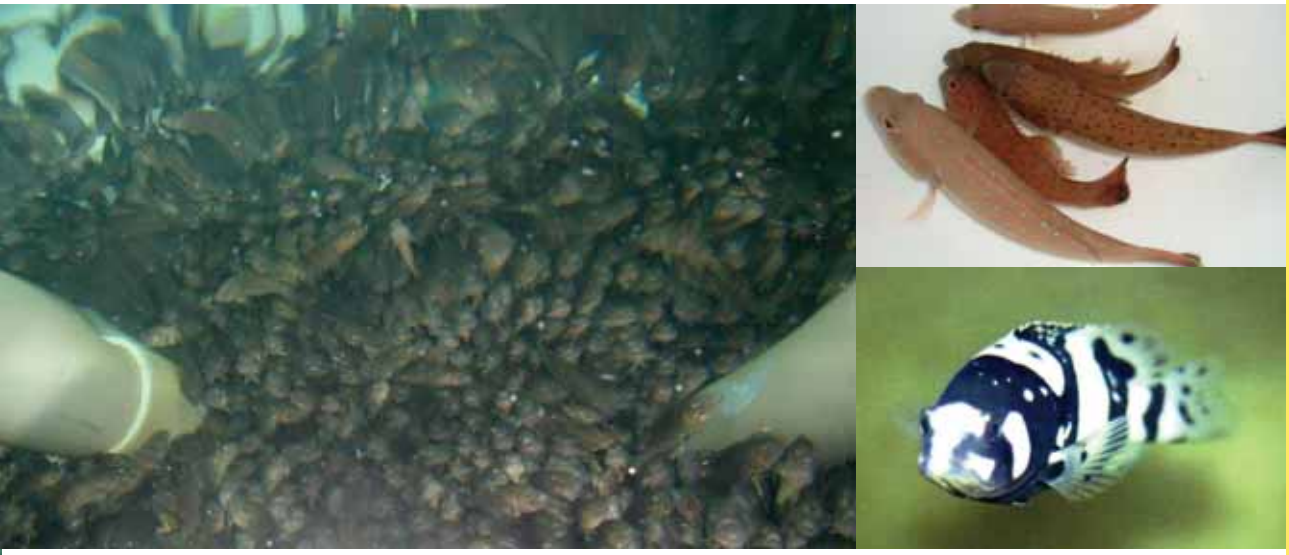
Dai Quen Chai is an example of pride and dedication in Taiwan's fish hatchery industry. He started with the growout of the lobster in 1985. In 1991, he was successful in artificial propagation of the tiger grouper in 1991, followed later with other species of the grouper. This continued with the short fin pompano in 1998 and leopard coral grouper in 2004. He watches his ponds through a TV monitor and his kitchen windows overlook the ponds.

Strengths

Taiwan's success story is attributed to its human capital, helped by government research and development efforts to develop and perfect breeding techniques for commercialisation. Training and transfer of technology to hatcheries cascaded down the line as hatcheries developed efficient sub units.

Its strength also lies in the ideal climatic conditions. Temperatures range from 20 to 28°C. Its geographical position in the Asian region close to the flourishing marine fish culture industries of Korea, Japan, China and Southeast Asia, provides opportunities for producers in Taiwan. Marketing is assisted by the network of overseas Chinese involved in aquaculture marketing and production in the region. The rapid development of Taiwan's offshore cage culture and of the region further accelerated developments.

As hatchery production usually requires very low investments while providing high profit margins, the industry easily attracted new entrants. They comprise milkfish farmers, seafood traders, and children of stakeholders in aquaculture as well as students from high school and those with higher degrees in aquaculture. With the downturn in



From left (clockwise): juvenile of coioides, coral trout and giant grouper

marine shrimp production in 1988, many shrimp farmers and shrimp fry producers shifted to the production of marine fish fry and fingerlings.

At present, the supply chain comprises of broodstock farmers and fertilized egg providers supplying fry and juvenile producers who in turn supply grow out farmers and broodstock farms. In between them are 20 brokers. There are over 1,000 farms involved in fry and juvenile production. To promote the country as the fish fry supply centre of the Asia Pacific region, the Fish Breeding Association Taiwan (FBAT) was established in 1996. It currently has 430 members. The association assists in marketing and maintains the supply and demand balance of the fish seed market.

Supporting these producers is the live feed industry which currently comprises 55 producers of rotifers (23) copepods (20) and Artemia (12). Production volumes total 2.5 tonnes/year of rotifers, 900 tonnes/year of copepods and 380 tonnes/year of Artemia. In addition, there are numerous companies marketing formulated diets, equipment, chemicals and veterinary supplies.

Recently, the focus is on the production of grouper fry and fingerlings for the grow out of this highly valued group of fish in Taiwan and other countries. Net incomes are high from the production of these species. In comparison with the breeding of seabream in outdoor systems, profit margins from breeding E. lanceolatus are lucrative. Costs of production range around USD186.88/1000 fry compared to the selling price of USD698.53/1000 fry. In contrast, the cost of production for seabream is USD59.06/1000 fry and selling price is below cost at USD29.41/1000 fry.

Since 1994, reductions in production costs have been achieved in indoor hatcheries for *E. coioides*. In 1994, the cost for producing 1000 fry was USD321.80 and in 2002, it declined to USD65.88. However, in 2003 the average production cost increased to USD80.47/1000 fry as the annual fry production for a hatchery of 300 tonnes, declined to 250,000 from 350,000 pieces. The proportion of costs for feed, labour and rentals has increased significantly for the last two years, whilst cost of eggs has declined (Table 2).

Table 2: Changes in production costs for *E. coioides* in indoor hatcheries

Year	1994	2002	2003
Production capacity(tonnes)	700	300	300
Production of fry/yr	119,000	350,000	250,000
Production cost of fry/1000 pcs (USD)	321.80	65.88	80.47
Price for 1000 fry (USD)	676.47	117.64	117.64
Breakdown of production costs (%)			
Egg	35	4	5
Feed	16	27	15
Salaries	37	46	53
Electricity	3	5	5
Rentals	9	18	20
Others	nd	1	1

Threats

Despite these reductions in costs of production, the industry in Taiwan faces threats from producers in Southeast Asian countries and China. These countries are not only building up capacity to produce fry and fingerlings but they are also refining breeding technologies. Taiwan managers have also set up production facilities outside Taiwan such as in China's Hainan Island. In all, these producers have the added advantage of lower costs of labour and land in comparison to those based in Taiwan.

Weaknesses

Production of several species of fry has declined over the last three years (Table 3). Apart from high costs of manpower and land, the industry in Taiwan is plagued by disease outbreaks, unstable quality and production. The industry still remains a backyard – one which has not adopted advanced techniques nor introduced any automation to reduce labour costs.

Opportunities

For the industry to move forward, there are research plans to develop new species such as the yellow fin tuna. Vaccination and quick diagnosis of disease may be essential to control production. More attention to water quality management is also needed.

It will also need to look at spawner stock selection such as using molecular markers. For stock improvement, the government should embark on a breeding program, selecting for characteristics for fast growth and stress tolerance. The need to establish excellent strains should be promoted. This can be done with the cooperation of nuclear broodstock farms.

More progress can be achieved through internationally coordinated projects. The strategy should be a set up of a network between research and production groups in Taiwan and other countries. Both government officials and hatchery managers need to work together for quality certification and to establish trademarks and build a brand in the market.

Table 3: Annual estimates of fry production (X1000). Source from Fish Breeding Association Taiwan (FBAT) and personal communication

Fish Name, species	2002	2003	2004
Milkfish, *Chanos chanos*	395,500	120,00	105,000
Cobia, *Rachycentron canadum*	1,300	3,000	5,500
Orange spotted grouper, *Epinephelus coioides*	25,200	21,200	8,700
Giant Grouper, *Epinephelus lanceolatus*	-	2,500	2,530
Tiger grouper, *Epinephelus fuscoguttatus*	-	-	9,100
Leopard coral grouper, *Plectropomus leopardus*	-	-	400
Short dorsal fin, *Trachinotus ovatus*	15,400	77,000	5,050
Giant seaperch, *Lates japonicus*	-	20,500	6,700
Pink snapper, *Lutjanus erythropterus*	8,100	5,800	6,000
Seba snapper, *Lutjanus sebas*	2,200	2,600	1,150
Four finger threadfin, *Eleutheronema tetradactylum*	6,200	2,300	-
Common slipmouth, *Leiognathus equulus*	-	5,050	27,500

Broodstock ponds

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Nucleotides as the only feed for larval shrimp

The role of nucleotides in overcoming stress is well known in juvenile shrimp. However, does it have a role in the growth and survival of shrimp larvae? By J.W. Hertrampf, S.K. Mishra; P.K. Biswal*

In a number of experiments, the role of nucleotides as "immunostimulatory substances" in juvenile shrimp under conditions of induced stress has been investigated. A fortification of feed with nucleotides at levels of up to 0.2% increased survival of juvenile *Penaeus monodon* when stress such as changing salinities and extremely high salinities were induced (Hertrampf, 2003).

Nucleotides in the early larval stage of cultured shrimps may have a beneficial effect on the development but to date there are no reports on nucleotides as a food for larval shrimp.

Artemia as larval feed

Presently the major food for shrimp larva is Artemia. It is estimated that 85% of cultured marine animals are reared with Artemia (Komis, 1992). The nutritional value of various Artemia strains differ (Table 1). Newly hatched brine shrimp have high energy content, but 48 hours after hatching a large portion of their lipids is used and their energy content reduced (Landau, 1992).

Table 1: Chemical composition of *Artemia salina* from various countries (% in dry matter) (Watanabe (1988)

	Crude protein	Crude fat	Ash
Eggs			
San Francisco	54.4	6.4	6.3
South America	51.5	10.5	13.0
Canada	47.5	4.8	15.3
Larvae			
San Francisco	59.2	19.4	11.7
South America	71.4	17.6	11.0
Canada	57.6	17.8	12.7

However, Artemia can be used to "bio-encapsulate" nutrients, hence their chemical composition can be manipulated (Dhert and Sorgeloos, 1995). This will alter the composition of the Artemia itself as their gut will be packed with additional nutrients in the form of algae or yeast (Landau, 1992).

Based on the above characteristic of Artemia, it will be possible to enhance the nutritional value of Artemia nauplii by feeding them with nucleotides. In this case Artemia nauplii will act as a transfer mechanism for nucleotides during the early larval stage of shrimp. Consequently, the immune system of shrimp larvae may be strengthened, followed by an improvement in survival rates.

Nucleotides in larval feeding

However, in these preliminary trials, it was decided to provide shrimp larvae with nucleotides directly, rather than through Artemia nauplii and study their effects. The feeding value of nucleotides for larval shrimp was then compared to that of non-enriched Artemia nauplii.

Table 2: Nutritional value of shrimp larval feed (% dry matter) used in experiments.

	Artemia Cyst	Artemia Nauplii	Nucelotides[1]
Moisture	11.2	31.5	6.8
Crude protein	61.8	67.9	56.3
Crude fat	4.0	0.2	6.7
Crude fibre	27.9	26.4	3.0
Crude ash	4.8	3.6	9.8
Calcium	0.70	0.48	1.78
Phosphorus	0.53	0.35	1.29
Ca:P ratio	1.32	1.37	1.38
HCl Pepsin digestibility	13.4	49.6	91.1
Digestible energy[2] kcal/kg	2792	2734	3511
Digestible energy MJ/kg	11.7	11.4	14.6

[1] *Vannagen, is a nucleotide product of Chemoforma A.G., Augst/Switzerland*
[2] *Calculated*

In a series of experiments over two rearing cycles, Artemia was completely replaced by nucleotides[1] as food for black tiger shrimp *(P. monodon)* larva. In the pre-trial period of five days, 2,400 mysis-3 were stocked in six glass aquaria, each of 80 litre capacity. They

Nutritional value of nucleotides

A nucleotide consist of a nitrogenous base (either purine or pyrimidine), pentose sugar and one or more phosphate group. Just as amino acids are the single units of a protein chain, nucleotides are basic building blocks of the nucleic acids RNA and DNA. Recent research suggest that nucleotides are "semi-essential" nutrients for mammals, poultry and fish (Carver and Walker, 1995; Devresse, 1998).

In shrimp, it is not known whether nucleotides can be synthesized de novo. The production of these nutrients utilizes metabolic energy. It can then be speculated that as the natural food of shrimp has an abundant supply of DNA and RNA, shrimp may have limited capacity to do this. The positive role of nucleotides in shrimp nutrition have been deduced because such ingredients such as fish solubles, complete fish meals, yeast and yeast extracts, are deemed essential in shrimp development. These ingredients have in common a high content of nucleic acids, the natural polymer for nucleotides. (Devresse, 2000).

were then subdivided into two groups of three replicates. Consequently the stocking density was five larvae per litre of water.

The actual trial period lasted for 15 days for each cycle. In the control group, Artemia was fed at a rate of 10 animals per larva per feeding. In the treatment group, nucleotides were fed at a daily rate of 20% of body weight of larva. There were four feeding times a day with the first one at 0600 hours and the last at 2200 hours.

The nutritional values of both feed types are given in Table 2. Because of the high moisture content of Artemia nauplii, the nutrients are presented on dry matter basis. It is evident that crude protein of Artemia is substantially higher than of the nucleotides. But in contrast, the digestibility of nucleotides was twice that of Artemia, as indicated by hydrochloric-pepsin digestibility values. The lower fat content in Artemia nauplii as compared to that in cysts showed that it has used the energy. The calculated digestible energy was also substantially different and favoured the nucleotides. This was attributed to the low fat content of Artemia nauplii.

Approximately 50% of water was exchanged daily. Water parameters were recorded and mean water quality and microbiological parameters did not show any remarkable differences between both groups (Table 3).

Table 3: Mean water±SD quality parameters for both rearing cycles

		Treatments	
Parameters	Units	*Artemia*	Nucleotides
Salinity	ppt	29.0±3.0	29±0
pH		8.0±0.2	8±0.2
Temperature	°C	29.5±1.5	29.5±1.5
Dissolved oxygen	ppm	3.8±0.4	3.9±0.5
Alkalinity	ppm	160±12.0	168±10
Green colonies	cfu/ml	10.0±4.0	12± 5.0
Yellow colonies	cfu/ml	72.0±18.0	78±14.0

Table 4 Performances of *Penaeus monodon* after feeding Artemia and nucleotides

		Treatments		Change as % of artemia-fed treatment (100%)
	Units	Artemia	Nucleotides	
Mysis stocked	nos	1200	1200	
Replicates	nos	3	3	
Postlarvae harvested				
First cycle	nos	108	116	
Survival	%	27.0±15.0	29±12.0	107.4
second cycle	nos	51	61	
Survival	%	12.8±10	15.1±8.0	118.4

Responses

In trials with post larvae, parameters such as weight gain and feed conversion rate cannot be recorded or the results may be too variable. The parameters for this kind of trials are observations of the general health, survival rate and responses to stress of the post larvae.

The survival rate of larvae during the first cycle was better for both groups as compared to that during the second cycle (Table 4). In comparison to the Artemia group the nucleotide group had a survival rate of 7.4% (first cycle) and 18.4% (second cycle), respectively. However, differences were not statistically significant.

The general health analysis for both groups did not show any differences (Table 5). Larvae exposed to various stress tests for determination of stress resistance showed that both groups have equal stress resistance capacity of 100% (Table 4). For the three tests (salinity test, formalin test, temperature test) a survival rate of 100% were recorded. Salinity was reduced by 25 ppt and survival recorded after three hours. In the formalin test, larvae were exposed to 200 ppm formalin and survival recorded after two hours. In the water temperature test, temperature was reduced by 10°C and survival recorded after one hour.

Table 5: Health status of shrimp at the end of the trials

	Treatments			
	Artemia		Nucleotides	
	Ist Cycle	2nd cycle	Ist Cycle	2nd Cycle
Activity	good	good	good	good
Size	normal	slender	normal	slender
Gut:Muscle Ratio	1:4	1:4	1:4	1:4
Shape	straight	straight	straight	straight
Colour	Golden brown	Light golden brown	Golden brown	Light golden brown
Hepatopancreas	Normal	Normal	Normal	Normal
Gut	full	full	full	full
Telson	Well developed	Well developed	Well developed	Well developed
Chromatopore Development	Normal	Normal	Normal	Normal
Fouling	Nil	Nil	Nil	Nil
Bacterial Infections	Nil	Nil	Nil	Nil
Deformities	Nil	Nil	Nil	Nil
Size Variation	high	high	low	low

Are nucleotides suitable as larval feed?

In addition to the immunostimulatory properties, the nucleotides had good feeding values when fed directly to early stage shrimp larva. Microscopic observations of the gut of shrimp revealed that the nucleotides were accepted and consumed well by larvae.

The statistically non-significant differences in survival rates between both groups proved that nucleotides is a suitable alternative to Artemia as larval food. An additional advantage of feeding nucleotides is that no time is spent for hatching and preparing Artemia cysts.

Long term effects

What are the effects of feeding nucleotides in the early stage of shrimp larvae on future growth performance? To investigate this, a follow-up trial with larvae from the second cycle of the above experiment was carried out. In these experiments, 32 larva were stocked into 80 litre tanks. In the three treatments, two replicates of ex-Artemia fed larva and ex-nucleotides group were fed commercial feed. Another group of ex-nucleotide larva were fed pelletised feed with 0.2% nucleotides. Experimental parameters were similar to the previous trials (Table 3). Shrimp were fed daily at a feeding rate of 20% of their body weight with pelletised starter feed. There were four feedings a day.

The results of this 60-day trial of using ex-Artemia and ex-nucleotides fed larvae showed the advantage of feeding nucleotides during the larval stages. The lower mortality rate which was statistically significant from the group that was last fed Artemia, demonstrated the long term effect of feeding nucleotides during the larval stage. However, weight gain and feed conversion of the nucleotide group were slightly better but not statistically significant (Table 6).

Furthermore, the effect of feeding 0.2% nucleotides to the ex-nucleotide juveniles demonstrates clearly the immunostimulatory properties of the product. Weight gain, specific growth rate and the mortality rate are statistically significantly improved. This means that, without any stress situation, under normal conditions, nucleotides also have performance promoting properties.

Conclusion

Although there is no significant difference in the tested parameters between feeding nucleotides and Artemia for larval shrimp, there are benefits that could favour the former. The follow-up trial with ex-postlarvae, showed the advantages of feeding nucleotides. Aside from immunostimulatory properties, nucleotides have performance promoting effects.

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The trials were carried out with "Vannagen" which is a nucleotide product of Chemoforma A.G., Augst/Switzerland, at the R&D-Unit of The Waterbase Ltd, Nellore/India.

Joachim Hertrampf

P.K. Biswal

S.K. Mishra

Table 6: Performance of postlarva after being fed Artemia or nucleotides in the early postlarval stages

	Treatments		
	Ex-Artemia+starter starter feed	Ex-Nucleotides+ starter feed	Ex-Nucleotides+ starter feed with 0.2%
Feed composition	Mean±SD	Mean±SD	Mean±SD
Nucleotides	0	0	0.2
Crude protein (%)	40.2	40.2	40.7
Crude fat (%)	6.2	6.2	6.2
Ca:P ratio	1:1.47	1:1.47	1:1.53
Digestible energy MJ/kg	11.8	11.8	11.7
HCl-Pepsin digestibility (%)	91.1	91.1	90.0
Initial wet weight (g)	1.53±0.22	1.43±0.27	1.51±0.25
Final wet weight (g)	6.61±1.19	6.64±1.23	7.25±1.21
Specific growth rate (%)	332.7	364.3	380.1
Feed conversion	1.04	1.02	0.93
Protein efficiency	0.47	0.46	0.42
Molting (no)	48	53	45

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From black tiger to freshwater prawn farming in Thailand

In 1998, the government, citing environmental reasons, imposed a ban on the farming of black tiger shrimp in areas classified as freshwater zones in Thailand's Central region. Many shrimp farmers badly affected by this ban gave up farming whilst others then switched back to the farming of the freshwater prawn *Macrobrachium rosenbergii*.

Today many still farm the prawn despite the popularity of the white shrimp *Penaeus vannamei* culture which was introduced as an alternative to black tiger shrimp culture in these areas. One of them is Jaran Fahwan, who operates a farm in Suphanburi.

Jaran was affected by the ban. "I gave up farming the tiger shrimp after I was arrested on charges of violating the environmental law", he said. "If you do not want to switch to the white shrimp, prawn farming is a good option for inland areas".

In the Central region, farmers such as Mr Fahwan raise the prawn in rectangular ponds as this eases harvesting using scoop nets. The ponds are 10 to 15m wide and the length varies from 50 to 150 m long. Prior to stocking, the farmers have nurseries to hold PL15 prawn. The usual stocking rate is 200,000-300,000 pieces /rai (0.16ha) for two months or until the prawn reaches 300-500 pieces/kg.

They are then moved to grow out ponds ranging from 4 to 10 rai (0.6-1.6ha). The stocking density in the grow out ponds is lowered to 10,000 to 30,000 pieces/rai.

According to Mr Fahwan, the lower stocking density will allow the prawn to grow larger. "If you want the size of the male prawn to reach 9-10 pieces/kg, the best stocking density is about 10,000 pieces/rai."

Farmers normally harvest the prawn after the fourth month or when the prawn is six months old, that is two months in the nursery ponds and four months in grow out ponds.

In the ponds, male and female prawns are separated into four groups-large males, large females, small males and small females. Females, due to their sizes have a much lower market value and more so if they are egg bearing. Large prawn (7-8 pcs/kg) can sell for 300-350 Baht/kg (USD7.14-8.3/kg) whereas smaller 18 pcs/kg prawn are sold for 160 Baht/kg (USD3.8/kg).

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Prawn is raised from PL15 to two months in nursery ponds before being transferred to grow out ponds. Freshwater prawn ponds are identified by the positioning and number of long arm paddlewheels.

Scoop nets are used for harvesting the prawn. Farmers practiced sequential harvesting of the prawn four or five times per crop. The first harvest starts when the prawn is about six months old.

Reducing feed costs in freshwater prawn farming

Farming of the freshwater prawn *Macrobrachium rosenbergii* (locally called galda) is rapidly expanding in Bangladesh. The species has been identified as one of the export products from aquaculture. In international markets the price of headless prawn range from USD 6.75 to USD 21.25/kg (DOF, 2001). In 2002, the production was 8,000 tonnes (FAO, Fish Stats, 2002). By Dr Md. Arshad Hossain

To assist farmers, the government and non governmental agencies have initiated several programs to boost production. The move is towards more intensive culture techniques in monoculture systems. This then implies that farmers need to move from using farm-made feeds to cost effective formulated feeds.

Though feeds for the shrimp are commercially available, these are too costly for rural farmers culturing the freshwater prawn. Commercial feeds for prawns are not easily available in the market. As feed costs are about 60-70% of production costs, a way to reduce this is to substitute the fish meal protein component with cheaper plant protein sources. Using locally available ingredients, three diet formulations were developed and tested in experimental ponds at the university.

The diets were formulated to contain 30% protein. Principal raw materials were fish meal and meat and bone meal which were varied at 10-20% in diet 1 and diet 2. Fish meal (60% crude protein) was Malaysian in origin and meat and bone meal (50% crude protein) was from Germany. Other ingredients were 15% mustard seed oilcake, 15-18% sesame meal, 32-35% rice bran, 4% molasses and 1% mineral-vitamin premix. Molasses was used as binder. The overall lipid level in test diets were higher (12%) compared to the commercial prawn feed (8%).

Table 1. Growth and food utilization of prawn fed different experimental diets in ponds for 3 months.

	Diet 1	Diet 2	Diet 3	Diet 4
Main ingredients in diet				shrimp
Fish meal (%)	20	15	10	starter
Meat and bone meal (%)	10	15	20	feed as
Sesame meal	15	18	20	the
Rice bran	35	32	30	control
Parameters	**Diet 1**	**Diet 2**	**Diet 3**	**Diet 4**
Mean initial weight(g)	2.90[a1]	2.90[a]	2.90[a]	2.90[a]
Mean final weight(g)	46.32[a]	39.30[b]	34.36[b]	40.43[ab]
Weight gain(g)	43.42[a]	36.40[b]	31.46[b]	37.53[ab]
%Weight gain	1497[a]	1255[b]	1085[b]	1294[ab]
SGR(%day)	3.12[a]	2.90[bc]	2.74[c]	2.92[b]
FCR	2.61[a]	3.16[b]	3.36[b]	2.80[a]
PER	1.24[a]	1.03[b]	0.99[b]	1.16[a]
Survival(%)	78[a]	72ab[b]	68[b]	75[ab]
Production (kg/dec/90 days)[2]	5.78[a]	4.53[c]	3.73[d]	4.85[b]
Total production (kg/ha/90 days)	1427.6[a]	1118.9[c]	921.3[d]	1197.9[b]

[1]Figures in the same row having same superscripts have no significant variation (P>0.05)
[2]One decimal 40m²

The performance of these diets was compared to a prawn starter diet, also with 30% protein, manufactured by Saudi Bangla Fish Feed Ltd. Three experimental diets were prepared and were fed to juvenile (2.90g) prawn in a 90 day trial (Table 1). Twelve ponds of 30m² were used with three replicates for each treatment.

The stocking density was 4 pl/m² and prawns were fed at a rate of 15% of body weight which was gradually reduced to 10% and 5% during the last two months. The amount of feed was divided into three rations per day. Feed was broadcasted over the ponds.

The results indicated no significant differences in survival, feed conversion rate and weight gain of prawn between the treatment diet 1 and the control. Survival ranged from 68 to 78% in comparison to the range of 50-60% generally reported. The high survival was attributed to the use of aeration in the ponds. The size variation of prawns at harvest was attributed to the stocking of variable sized juveniles.

A simple economic analysis was performed to determine the net profit in this monoculture system. Based on the wholesale price in Mymensingh market of Taka 300/kg (USD5.17/kg), it was concluded that a diet containing 20% fish meal, 10% meat and bone meal, 15% mustard oilcake, 15% sesame meal, 35% rice bran, 4% molasses and 1% vitamin and mineral premix was most suitable.

In economic terms, it was deduced that a net profit of Taka 161,980/ha/cycle (USD2,792) from a production of 1.4 tonnes/ha/cycle was possible by using this diet for the monoculture of the prawn. The price of this feed was 15 Taka/kg (USD 0.25/kg) in comparison to 23 Taka (USD 0.40/kg) for commercial prawn feed. (Note I US$= 58 Taka).

(extracted from the presentation by M.A Hossain, L.Paul and M.R Hasan on "Development of a suitable diet using locally available ingredients for the monoculture of the giant freshwater prawn Macrobrachium rosenbergii in ponds" at the 7th Asian Fisheries Forum).

Dr. Md. Arshad Hossain is Professor in the Department of Aquaculture, Bangladesh Agricultural University (BAU), Mymensingh. His research interests include nutritional requirements of cultured species, formulation of low cost diets for fish and crustaceans, nutrient digestibility of indigenous feedstuffs, anti-nutritional factors in plant feedstuffs and their effects on growth and metabolism in fish. He obtained his PhD (Fish Nutrition) from University of Stirling, Scotland in1989.

Reasons to access the EU seafood market

The European Union (EU) market, the world's single largest market for quality seafood products can offer opportunities for premium Australian seafood products. This is part of the Australian Seafood Council's widened strategy to access a new market.

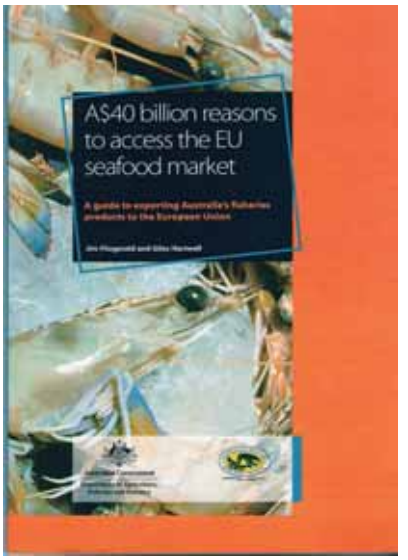
As a high cost producer of farmed shrimp, Australia cannot compete in the same commodity market as her Asian neighbours. The cost to produce 1kg of the black tiger shrimp in Australia is around AUD9.00/kg (USD7.1/kg) as compared to AUD4.00/kg (USD3.1/kg) in China. The recent deluge of low cost vannamei shrimp imported from China and sold at AUD11.00/kg (USD8.7/kg) at the Sydney Fish market, has widen the value gap between Australian produced shrimp (around AUD23/kg) and imported shrimp. It has also evoked the realisation that local producers can no longer depend on the loyalty of the domestic market.

According to producers, this higher cost of production in Australia is the result of the need to comply with the multilevel regulations for aquaculture farms. They are required to ensure discharges meet standards for total suspended solids (mean 20 mg/l to maximum 100 mg/l), total nitrogen (mean 0.8 mg/l to maximum 3.0 mg/l) and total phosphorus (mean of 0.10mg/l to a maximum 0.30mg/l, EPA, 2000). The relevant authorities have imposed these to secure the ecological sustainability of the industry.

There will be no compromise on the "clean and green" mode of shrimp production to reduce production cost, according to authorities. Henceforth, the industry has to seek other means to market their produce. Neither will the government impose retaliatory tariffs on imported shrimp, according to Ian Macdonald, Minister of Fisheries, Forestry and Conservation at the opening of the Australasian Aquaculture 2004 in Sydney in September, 2004. He added that in both domestic and export markets, Australia producers should maintain the image as a producer of premium quality seafood.

Sam Gordon, Sales and Marketing Manager of Seafarm Australia said recently at the Australian Prawn Farmers Association marketing and promotion day (Aquaculture News, October 2004), "the philosophical view is that competition is inevitable. Marketing Australian prawns must focus on the positive aspects and highlight the points of differences such as 'fresh not frozen' and 'Australian in origin'."

It is the more discerning market in the EU which exporters should target. In the EU, consumers emphasise on food safety issues and pay a lot of attention to the food supply chain. There is an increasing demand for high quality seafood from low risk seafood producers. Australian products which have 100% traceability, can meet the EU's stringent food safety and seafood handling regulations, according to the Australian Seafood Industry Council. To help producers understand this market, the council has released a guide book "A$40 billion reasons to access the EU seafood market".



This follows the "A$34 billion reasons to access the EU seafood marketî. Future publications will explore the seafood market in China and the Middle East.

Graeme Dear. "No risk is small when public safety is concerned.. "

At a technical session during the Australasian Aquaculture 2004 conference, Graeme Dear of Nutreco described graphically the changes in mindset of EU consumers which was particularly apparent after the BSE (mad cow disease) debacle. This had killed the idea that food is intrinsically safe not only for consumers within the EU countries but also in other European countries such as Norway. He added that traceability and environmental concerns are at the forefront.

Dear said, "No risk is small when public safety is concerned and retailers and governments have taken a stand in that food safety is an intrinsic part of food productionî. The perception of low prices as low quality and thus of dubious origin will also stay."

The EU market is also attractive because of the size and nature of consumers in the EU. The potential market will be in excess of 450 million consumers with the recent addition of 10 new members. The Euro 24.4 billon (AUD40 billion) market comprise mainly of fresh fish, chilled and frozen (45%) and crustaceans and mollusks (25%).

Another factor is the value of the Euro and the British Pound. Contrary to Australia's current markets, the EU market is not tied to the performance of the US dollar. The Australian dollar has also appreciated 53% against the dollar, making Australia imports less attractive in key Asian markets. This has been a main reason for the decline in value of exports in 2003/2004. According to the Council, the counter cycle of the Euro and US dollar will provide market opportunities for Australia producers when the US dollar is under performing.

As Australia already has a reputation for quality produce, exporters can have a foothold in the EU market. The bottom line is how the Australian producer can tap into this market. The industry council has set up the way in the guide book.

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Australia Seafood Exports

The Australian seafood industry has benefited from strong growth since the 1990s. It reached AUD2.3 billion in 2003 fuelled by developments in the production and marketing of the five main species- lobsters, pearls, shrimp, tuna and abalone. These account for 83% of the value of production. Shrimp accounted for AUD208 million whilst lobsters, AUD463 million, abalone, AUD216 million and tuna, AUD319 million. In total, aquaculture contributed AUD743 million to the export value. (Note: AUD1.27 to one USD).

Since the 1990s the destinations for exports have gradually diversified. In 1990-1991 over half of the exports went to Japan and during the 1990s China, Taiwan, Hong Kong and USA were important markets. Currently, Japan still remains the principal market, followed by Hong Kong as the gateway to the Chinese market. Recently, the Taiwanese market has decreased whilst the EU market has risen to 4th place.

Trends in EU seafood imports

The value of seafood imports into the EU has risen 55%. This trend will continue upward. Since 1996, all EU countries have increased their seafood imports by between 23 to 80%. Spain is the leading consumer followed by Italy, France and the United Kingdom. The increase is across the board for all preparations. Fresh, chilled and frozen crustaceans have increased by 62%.

Consumer preferences within the EU are changing as the direction is towards seafood as a substitute for alternative protein sources. This is helped by a continuing long term increase in wealth in the EU.

In 2003, Australian seafood exports to the EU totaled AUD93.6 million, dominated by shrimp and pearls. This rose 104% since 1996. (Extracted from Fitzgerald, J and Hartwell, G., 2004. A$40 billion reasons to access the EU seafood market, 81pp).

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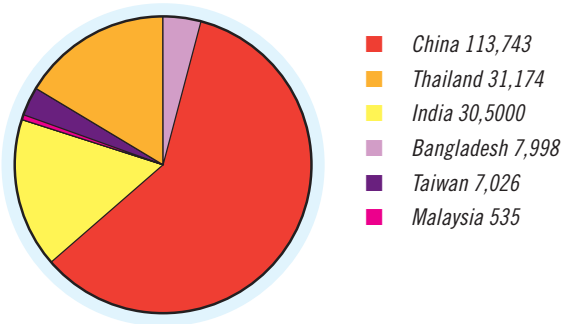
Production of the freshwater prawn in the top producer countries in Asia

Country	1997	1998	1999	2000	2001	2002
Bangladesh	4,534	5,751	5,394	5,504	9,471	7,998
China	42,851	61,868	79,055	97,420	128,338	113,743
India	1,500	3,900	7,000	16,600	24,230	30,500
Malaysia	143	281	653	1,338	752	535
Taiwan	7,551	8,165	7,223	8,149	6,859	7,026
Thailand	7,856	4,764	8,494	9,917	12,067	31,174
TOTAL	64,435	84,729	107,819	138,928	181,717	190,976

Trends in freshwater prawn farming

According to FAO statistics (Fishstat Plus, 2002) production of the freshwater prawn increased 44% from 4,764 tonnes to 8,494 tonnes in 1999 in Thailand. It has continued on its upward trend to 31,174 tonnes in 2002. Other Asian countries such as India registered an increase of 79% percent for the period 1998-1999.



Nutriway adds capacity for premix production

In November, 2004, Nutriway Vietnam held an opening ceremony of its new improved production lines. Nutriway General Manager, Mr. Frederic Salle opened the ceremony in the presence of Mr Ton Van Zealand, Consul General of the Netherlands, Mr. Phan Minh Dao from Dong Nai Committee and other guests. This was followed by presentations on the activities of the various departments of the Nutriway factory.

With the improvement to existing lines, Nutriway has now greatly increased its capacity for premix production. With the new one-tonne Forberg mixer, the company will be able to handle more premix production for the antibiotic free livestock and aquuaculture feed industries.

"The most recognizable advantage is that we have the ability to satisfy larger orders in a shorter amount of time", said Mr Francois Pellet, Deputy General Manager.

Ribbon cutting ceremony (From the left to the right: Mr. Ton Van Zealand, Consul General of the Netherlands, Mr. Phan Minh Dao from Dong Nai Committee, Mr. Frederic Salle, Nutriway General Manager and Ms Huong, Manager of the Nutriway factory)

"More importantly, with a separate production line for premix with antibiotics, we can continuously ensure that there is no cross contamination. All facilities have been upgraded to comply with GMP standards and a certificate will be obtained in early 2005. In addition the fully secure facilities are fitted with international veterinarians and feed standards".

With this increase in customer base, Nutriway has adopted technological advances. It has devised a method to trace and encode raw materials entering the factory. These raw materials are now all assigned a bar code. Software controls and records the different production steps. This allows for any batch to be recorded with all pertinent information (such as origin, history and actual proportion of each ingredient incorporated into the mix). The bar code is then automatically printed on each premix label. The validation of the premix label bar code is compulsory before the bagging process begins.

"Our traceability software enables us to record which customer receives which bag of premix". said Mr Pellet.

New Distributor for Alltech India

Alltech India has announced the appointment of A.A.Biotech Pvt. Ltd as the new distributor for their Aquaculture Solutions. Based in Chennai, A.A.Biotech Pvt. Ltd., will distribute the farm products in the aquaculture segment for Alltech India and will cover all of the important shrimp culture areas in both the east and west coast of India.

With a rich experience in various aspects of aquaculture, Managing Director Mr Uday Ram Jothy acknowledges "the strength of the team lies in the technical expertise it commands in the various aspects of aquaculture and the close relationship it maintains with the various stakeholders in the industry".

AA Biotech currently has a six member team along with a sister company, Sanjay Enterprises. This appointments follows a year of growth for Alltech India which recently announced the grand opening of their state-of-the-art manufacturing facility in Bangalore and the sponsorship of 12 PhD at the University of Agricultural Sciences, Bangalore, India.

Expanding facilities for SBBU

Next year, the Shrimp Biotechnology Business Unit (SBBU) will be moving to its new facilities at the NSTDA Science Park in Pathumthani, Thailand. The expanded facilities will enable the company to carry out more extensive contract research. Currently, it already does contract research for a diverse range of international companies, from feed and additives to probiotics and immunostimulants. It has wet lab facilities as well as access to commercial shrimp farms.

SBBU was established by the Thailand National Centre for Genetic Engineering and Engineering (BIOTEC) in 1999. It is the commercial arm of the BIOTEC's shrimp research and has patented many of the research findings. The staff and associates have also served as consultants in several areas and in several countries.

"It is this demand for contract research that has prompted us to expand. Usually trials are conducted in the laboratory and then extended to the field. We are already well implanted in Thailand as it is much cheaper for companies to contract out research here and also the results are more applicable to the region", said Business Manager, Dr Philippe Tacon.

One of its main functions is in disease diagnostics. SBBU produces and markets a wide range of kits. At the same time, they provide assistance in the setting up of PCR laboratories and also conduct training on the use of the PCR. This has been done in Sri Lanka and Thailand itself.

More information: Philippe Tacon, Tel: +66 2 201 5870-72; Fax: +66 2 354 7344; Email:ptacon@shrimpbiotec.com; www.shrimpbiotec.com

Expanding the field team

As part of its business plan in Thailand, genetic improvement company SyAqua Siam Co Ltd is building up its business development team. In marketing postlarvae, the business development team will be responsible in assisting farmers to have access to, and achieve the best, out of SyAqua products.

Glen Illing, Manager Director said, "We have proven that the technologies we use can have a dramatic effect on improving the performance of shrimp farming in Thailand. As we run our breeding programs, each generation of our products will be better than the last. Thai farmers, who though many operate small farms, are very technically aware of culture techniques. Combining SyAqua products with the Thai farmers cultivation knowledge and experience is a recipe for success Our Business development team will help to cement this success by bringing a little more knowledge and share experiences from our operations both in Thailand and abroad".

He added that, "It is important that we work closely with farmers when we supply them post larvae. We need to be well aware of the product they wish to produce and the restrictions they operate under such as salinity. The farmers themselves have different abilities and we try to work with them to optimize their performance so that they are profitable shrimp farmers and continue growing SyAqua postlarvae".

The company has set up several production units along the coastal areas of Thailand. Its nucleus breeding program expanded in its Nakhon Si Thammarat unit in October 2004. The company is also looking at extending the sales network through agencies and alliances with various organizations.

More information: Glen Illing, Tel: +66 2 661 7607; Fax: +66 2 661 7610; Email:glen.illing@syaqua.com; www.syaqua.com

And more from the Asian Fisheries Forum Trade show....

The show was small compared to the usual size of trade shows accompanying conferences. Asia Star Lab, Thailand, founded in 1999 and active in Thailand had a range of products for the monitoring of water quality parameters to premixes and feed additives. The company provides lab services such as in health diagnostics and quality control of postlarvae. Arachem Sdn Bhd, Malaysia displayed its range of water testing kits and monitors manufactured by Hach and YSI, USA. New from YSI is a hand held dissolved oxygen meter which features an impact resistant body and innovative field replacement DO electrodes.

Qgene Technologies, Taiwan displayed their WSSV -white spot detection and prevention system. The company said that they have built real time PCR with a high throughput of 96 samples per run and a result in 4 hours.

Maju Feed, Malaysia, a subsidiary of the Fisheries Development Authority of Malaysia markets feeds for the marine shrimp. Feeds are produced from the plant in Pantai Merdeka in the Northern part of West Malaysia. Hunza Consolidated is a major seafood processing company in Perak, Malaysia.

AWT Fusion Sdn Bhd, Malaysia, the joint venture with UK's Fusion Marine displayed some of its cage material used in the construction of offshore cages. The range of offshore cages from the company was featured in issue November/December 2004.

Teams from the University of Stirling's Aquaculture Technology Centre and DFID, Department of International Development were also there to explain their programs.

Peter Chu and Chung Chin Wu at the Qgene booth

Self cleaning aquaculture tanks

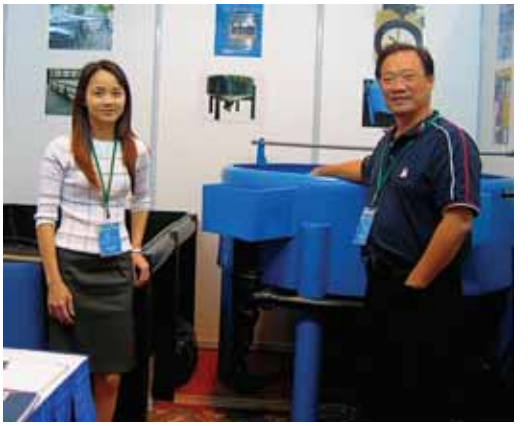
New in the region's aquaculture industry is Rotomas Technology (M) Sdn Bhd, a producer of moulded plastic products.The company has introduced its range of tanks, from those for rotifer culture and mollusk hatching to large rectangular tanks for shrimp postlarval rearing. Features of the tanks include high impact resistance, smooth and non adhesive walls, lightweight and all polyethylene or polyethylene composites for supports.

On display at the trade show area of the Asian Fisheries Forum were circular recirculating systems with biofilters for hatchery use. Also on display were tanks to hold fish after harvest which also serve to remove any off flavour prior to marketing. They incorporate biofilters systems, protein skimmers or foam fractionator.

Bluey Chew said, "These models are extremely popular in Australia. We are bringing these ideas to the region as these tanks are self cleaning and allow the operator to concentrate on the production side as well as reduce labour inputs'.

"We have sold these tanks to a hatchery in Brunei where they are used for the fry production of shrimp and finfish. They are also used for the seeding of oysters in tanks in an oyster production facility in Setiu, Terengganu, Malaysia", he added.

The company also produces at its factory in Selangor, Malaysia a range of systems for intertidal and sub tidal grow out of oysters and other shellfish. These have been used for the production of scallops and seaweeds in Australia. In addition, Rotomas is able to manufacture tanks, raceway systems and filteration units to specific requirements.



Bluey Chew and Jessie Ngu with circular tanks equipped with protein skimmer at the AFF trade show in Penang.

More information: Bluey Chew Tel: +60 3 8724 1633 Fax: +60 3 8724 3733 Email: bluey@pd.jaring.my Website: www.rotomas.com

Affordable and reliable delivery of oxygen in aquaculture ponds

This range of VSA oxygen generators from Air Products has been specially designed to meet the needs of the aquaculture industry. As in any oxy-generation process, air is passed through a bed of zeolite which then separates oxygen from nitrogen and other gases in the air. After a series of steps, the result is a continuous supply of 90% pure oxygen.

To date, these VSA oxygen generators, supplied in a single module (feed vacuum blower, automatic valves and PLC control system) have been supplied to farms in India, Malaysia, Australia, New Zealand and Korea. According to the company, in most locations where the VSA systems have replaced equivalent flow rate PSA generators, considerable savings have been achieved.

Tony Rumbold, Managing Director of Scanz Technologies, said that in preparing a comparison between oxygen generating capabilities of VSA (Vacuum Swing Adsorption) generators versus that of the more traditional compressor unit of PSA (Pressure Swing Adsorption) generators, the user needs to look at the benefits of the former.

Tony Rumbold, Scanz Technologies at the Australasian Aqauculture 2004 trade show.

A major difference is the absence of an air compressor in the VSA models which means no maintenance as well as reduced running and power usage. The presence of a vacuum blower in VSA generators, absent in PSA generators, allows water vapour and hydrocarbons to be flushed out and reduces the likelihood of contamination of the single zeolite sieve bed contained in one vessel.

The company said that there are various options to suit the various power requirements. Each generator is packaged to simplify installation such that it is "plug and play."

More information: Tony Rumbold. Email: scanztech@callplus.net.nz Website: www.scanztech.com

ANNOUNCEMENT

ASIAN AQUAFEEDS 2005

A regional seminar for the aquaculture feed industry in Asia

Co-organizers :

Established 1987

"Charting New Strategies for the Sustainable Development of the Asian Aquaculture Feed Industry"

Organized by : Malaysian Fisheries Society
Gold Sponsor : Pristine Group of Companies
International Media Sponsor : Aqua Feeds Formulation & Beyond

Aquaculture Feeds in Asia

Aquaculture in Asia is an important industry contributing more than 90% of world production. In 2002, Asia produced 25 million tonnes of finfish and crustaceans valued at US$33 billion.

Asia aquafeed production is estimated at 5.4 million tonnes in 2002. In view of the scale of this industry and that formulated feeds can comprise up to 60% of the total production cost in intensive aquaculture operations, more efficient technologies must be developed to convert raw materials into aquaculture produce.

The 2-day seminar is planned with the aim of bringing together industry stakeholders within the field of aquaculture feed production to discuss the latest available technologies and resources so as to create a sustainable strategy for the growth and development of aquaculture in Asia.

Who should attend?

This 2-day seminar is to be held in the city of Kuala Lumpur, Malaysia and will be of interest to fish and shrimp feed producers, nutritionists, feed mill operators, feed milling and processing equipment suppliers, feed ingredient suppliers, as well as researchers, aquaculture producers and policy makers.

TOPICS

- Formulation & Nutrition
- Raw Material Selection
- Quality Control & Product Development
- Manufacturing & Process Technology
- Market Requirements & Trends

VENUE & DATE

PAN PACIFIC HOTEL, KUALA LUMPUR
12th & 13th APRIL 2005

REGISTRATION

	Before March 1st 2005	After March 1st 2005
Local participants	RM 450.00	RM 550.00
International participants	USD 200.00	USD 250.00
Members of the MFS	RM 350.00	RM 450.00
Students	RM 250.00	RM 350.00

Interested parties should send in their Registration forms to the Secretariat Office with payment made out to the "Malaysian Fisheries Society".

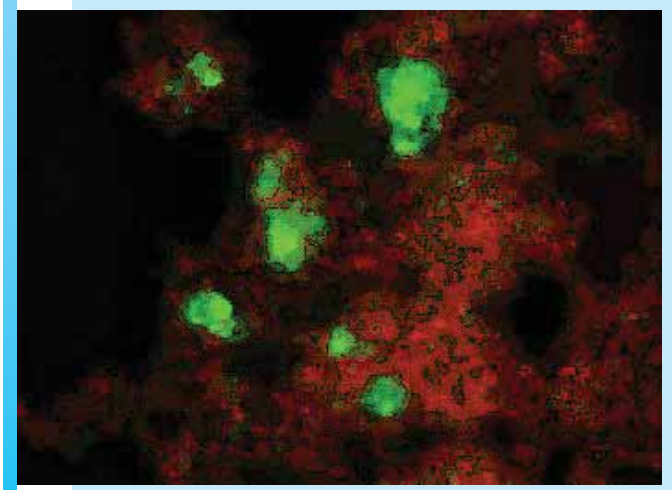
CALL FOR PAPERS

Oral papers, posters and abstracts will be in English. Oral presentations are by invitation only. Abstracts are invited for poster presentations. Presenters are invited to submit abstracts, not exceeding a full A4 size page. Dateline for the submission of abstracts is January 31st 2005. Format for the presentations can be obtained on request by email to wkng@usm.my or ngwingk@yahoo.com. Acceptance of papers will be at the sole discretion of the Technical Committee.

The Organizing Committee - **Asian Aquafeeds 2005**
Malaysian Fisheries Society
Aquatic Animal Health Unit
Faculty of Veterinary Medicine
Universiti Putra Malaysia
43400 Serdang, Selangor, Malaysia.
Telephone : + 603-8946 8288
+ 604-6533 888 Ext:4005
Fax : + 603-8948 8246
Email : myfisoc@time.net.my
annie@putra.upm.edu.my
Website : http://www.vet.upm.edu.my/~mfs

New tool to control ammonia and nitrite in shrimp ponds

In a paper presented at the 7th Asian Fisheries Forum, in Penang, Malaysia, a new consortium of two natural nitrification bacteria effective in the control of ammonia and nitrite in commercial shrimp ponds was described. Dr. David Drahos of Novozymes Biologicals, said that this new product called NB800 (commercial name NNC 553) induced low ammonia and nitrite levels (averaging 0.3 and 0.2ppm, respectively) in 11 full-scale commercial ponds for *P. vannamei* shrimp at SAM-D Shrimp Farms in Chumphon, Thailand. The trials were conducted with the Shrimp Biotechnology Business Unit of Biotec.



A microscope picture of this consortium after fluorescent in-situ hybridization (FISH) where the two key bacteria (ammonia-reducers are red; nitrite-reducers are green) exist as a team in a large shrimp-beneficial community

In two separate trials during 2004, with stocking densities over 100 postlarvae/m^2, only two of the eight non-treated control ponds survived to harvest, while all 11 treated ponds provided high shrimp output. The yield was reported to increase 98% on average and size was improved by 12%, resulting in an average profit increase of up to 150% per pond.

"The key to success", said Dr. Drahos "appears to be the highly stable and active 'bio-flock' structure of the consortium, which acts quickly and effectively to remove excess ammonia and nitrite that the shrimp normally produce during growth."

The NB800 material is unusually tolerant to a wide range of salinity (1-28 ppt) and has a long shelf-life. In addition, the consortium is very compatible with a natural probiotic Bacillus bacteria blend (called PB522), which leads to better water quality and shrimp disease resistance.

More information: Purusotman Ramasamy, Business Manager; Tel: +60 3 8996 1588; Fax: +60 3 8996 1344. Email: puru@novozymes.com
Website:www.novozymes.com

New in tank/pond Aeration

Australian company Proaqua Pty Ltd has introduced "Bubble-Aetor". This is an aeration system provided through pressure differential piping which provides a constant aeration and circulation of the tank and pond waters. Here, fine bubbles are produced through slits in tubings of blended polyethylene. The slits are positioned at 25 per metre and release minute bubbles when a differential pressure of 3psi is applied. The pipe is weighted down with a lead wire, incorporated in its structure, allowing for easy installation.

Proaqua's Doug Pearson said, "An important aspect of this technology is the consistent aeration of the tank or pond and which can be controlled by reducing or increasing the number of slits. More importantly, the circulation is achieved with 50% of the horsepower required with conventional surface aeration." He added that higher efficiencies can be gained with deeper water.

More information: Doug Pearson Email: doug.pearson@bigpond.com

Doug Pearson at the Australasian Aquaculture 2004 Trade show

Selamat Datang

World Aquaculture 2005

"International Peace and Development Through Aquaculture"

After the gathering in Beijing, China in 2002, World Aquaculture returns to Asia in 2005. Bali, Indonesia's eastern resort island is the venue for World Aquaculture 2005 from 9 to 13 May.

As the host country, Indonesian organizers are lead by the Department of Marine Affairs and Fisheries, Indonesian Fisheries Society and Indonesian Aquaculture Society. They said that the meeting will not only discuss developments in aquaculture but also bring commercial aquaculture in the Asian Pacific region, particularly that of Indonesia, to the forefront.

As world aquaculturists focus on Indonesia, it is hoped that this will generate new business opportunities in shrimp, grouper, tilapia, seaweed, pearls and other export products for Indonesian entrepreneurs.

Similar to previous meetings, WA2005 will focus on global issues in aquaculture and feature producer programs. Programs are categorized under global issues -economy and environment, sustainable production systems, marine and freshwater finfish culture, crustacean culture, mollusk culture and other species. Program developments are available at www.was.org

Additionally, farm tours will be organized to the Gondol Research Institute for Mariculture and the South East Center for Ocean Research and Monitoring (SEACOM).

Indonesia Fish 2005

This year's "Third Indonesian International Ornamental Fish and Accessories Expo 2005" will be held together with World Aquaculture 2005 in Bali, Indonesia, from 10-12 May. This large exhibition of ornamentals will target the ornamental fish industry from collectors to hobbyists.

Indonesia has a large ornamental fish industry and is currently is third after Singapore and Malaysia in terms of the value of exports. Exports totalled USD 13.72 million. It is apt that the show coincides with the WA2005 as the market for ornamentals is dominated by the US, valued at USD 61.8 million followed by Japan (USD 28.4 million), Germany (USD22.6 million) and United Kingdom (USD 21.1 million). The world market for ornamentals is valued at more that USD one billion with 30-35 dominant species. The accessories trade is worth USD 14 billion (source: www.pikiran-rakyat.com)

"Indonesian aquaculture and tourism"

This was a special session at the last World Aquaculture Meeting in Hawaii. Bali as a great location for the meeting was introduced by the Ministry of Marine Affairs and Fisheries and the Directorate General of Aquaculture. A dance routine introduced the uniqueness of Balinese culture.

Some unique aspects of Indonesian aquaculture were outlined by Dr. Dean Akiyama, CP Indonesia. Indonesia has the world's largest shrimp farm which produces 20,000 tonnes and the world's largest tilapia farm producing 12,000 tonnes. It also has the world's largest cage farm producing 15,000 tonnes and largest Arowana facility with a production of 10,000 pieces per year.

Balinese dance at the "Indonesian aquaculture and tourism promotion" for WA2005 at the last World Aquaculture 2004 in Hawaii

World Aquaculture 2005 Exhibition

Along with the conference, there will be a trade show. The schedule is as below.

Details on how to reserve a booth is available from John Cooksey, Email: worldaqua@aol.com or Royalindo Convention International, PIC Building, Ground Floor, J1 Telukbetung No 43, Jakarta 10230 Indonesia, Tel: +62 21 314 0982, Fax: +62 21 3193 4470 Email: giri@royalindo.com

Venue: Bali International Convention Center • Nusa Dua, Bali, Indonesia

MONDAY, May 9	TUESDAY, May 10	WEDNESDAY, May 11	THURSDAY, May 12
MOVE-IN	MOVE-IN	TRADE SHOW OPEN	TRADE SHOW OPEN
12:00-18:00	*08:00 - 10:00*	*09:30 - 18:00*	*09:30 - 16:00*
	TRADE SHOW OPEN	HAPPY HOUR	MOVE-OUT
	10:30 - 18:00	*17:30 - 18:30*	*16:00 - 20:00*
	HAPPY HOUR		PRESIDENT'S RECEPTION
	17:30 - 18:30		*19:00 - 22:00*

4-6 February
India International Seafood Show
Kolkata, West Bengal
Tel: + 91 484 231 1979/2812
Fax: +91 484 231 3361/4467
Email: raj@mpeda.nic.in
Web: www.indianseafoodfair.nic.in

24-25 February
Workshop on Antibiotic Resistance in Asian Aquaculture Environments
Chiangmai, Thailand
Contact: Dr Supranee Chinabut
Email: supranee@fisheries.go.th
Web: www.medinfo.dist.unige.it/Asiaresist/workshop/

12-13 April
Asian Aquafeeds 2005
Kuala Lumpur, Malaysia
Email: myfisoc@time.net.my; annie@putra.upm.edu.my
Web: www.vet.upm.edu.my/~mfs

9-13 May
World Aquaculture 2005
Bali, Indonesia
Contact: John Cooksey
Tel: +1 760 432 4275
Email: worldaqua@aol.com
Web: www.was.org

8-10 June
China International Seafood and Fisheries Exposition
Dalian, China
Tel: +86-411 8480 9622
Fax: +86 411 8480 9628
Email: seafood@dxceczch.mail.sohu.net; seafoodexpos@yahoo.com.cn
Web: seafoodexpos.com

14-16 June
Vietfish 2005
Ho Chi Minh City, Vietnam
Contact: Vo Thai Phong
Tel: + 84 8 511 0930/511 0932
Fax: +84 8 511 0931
E-mail: vaseo-org@hcm.vnn.vn or phongvt@vasep.com.vn
Website: www.vietfish.com.vn

5-9 August
Aquaculture Europe 2005
Trondheim, Norway
Email: ae2005@aquaculture.cc
Web: www.easonline.org/agenda/en/AquaEuro2005/default.asp

5 – 9 September
Larvi 2005- 4th Fish & Shellfish Larviculture Symposium
Gent, Belgium
Fax: +32 9 264 4193
Email: larvi@UGent.be
Web: www.UGent.be/aquaculture

25-28 October
6th Symposium on Diseases in Asian Aquaculture (DAA VI)
Colombo, Sri Lanka
Contact: Melba Reantaso, FAO
Email: Melba.Reantaso@fao.org (quote subject:DAA VI)
Web: http//afs-fhs.seafdec.org.ph/

2005

List your events in AQUACulture AsiaPacific Magazine for free. Mail details to: Aquaculture Asia Pacific Magazine, 3 Pickering Street, #02-36 Nankin Row, China Square Central, Singapore 048660., or email to the Editor at zuridah@aquaasiapac.com, Fax: +603 2096 2276

India International Seafood Show, Kolkata, West Bengal, 4-6 February, 2005

This is a biennial event jointly organized by the Marine Products Export Development Authority (MPEDA) and the Seafood Exporters Association of India (SEAI) . IISS-2005 is the 15th in the series. The first India International Seafood Show was held in 1973 in Mumbai. The target groups are local and foreign companies involved in the seafood trade.

The main objective of IISS-2005 is to create a platform to exhibit the capability of the industry in India in the production and marketing of quality seafood products. It will also be a meeting place for buyers and sellers of marine products to renew their contracts and for new agreements.

A full day business session will be held on the 5th at the Hyatt Regency, Kolkata. At this session, specialists in the fishery field from India and abroad will give presentations and discuss topics of interest.

Contact: Tel: + 91-484-2311979, 2312812, Fax: + 91-484-2312812, 2313361, 2314467. E-mail: raj@mpeda.nic.in , mpeda@mpeda.nic.in Web: http://www.indianseafoodfair.nic.in/

WORLD AQUACULTURE 2005

May 9-13, 2005

Bali International Convention Center
Nusa Dua, Bali - Indonesia

INTERNATIONAL PEACE AND DEVELOPMENT THROUGH AQUACULTURE

The Annual International Meeting of :

WORLD AQUACULTURE Society

ASIAN PACIFIC CHAPTER WORLD AQUACULTURE SOCIETY

INDO FISH 2005

Sponsored by:

Ministry of Marine Affairs and Fisheries

Indonesian Fisheries Society

Indonesian Aquaculture Society

State Ministry of Culture and Tourism of The Republic of Indonesia

Associate Sponsors

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- ASEAN Fisheries Federation
- Indonesian Fisheries Federation
- Aquacultural Engineering Society
- Network of Aquaculture Centres in Asia-Pacific
- Global Aquaculture Alliance
- International Assoicate of Aquaculture Economics and Management
- Indonesian Coral Shell and Ornamental Fish Association
- Indonesian Shrimp and Fish Farming Association
- Indonesian Feed Milling Association
- Indonesian Pearl Culture Association
- Indonesian Seaweed Association
- Indonesian Ornamental Fish Exporter Association
- Indonesian Koi Hobbiest Association
- Indonesian Shrimp Feed Association
- Indonesian Tuna Association
- The Frozen Seafood Exporter & ProducEer Association of Indonesia
- Indonesian Fisheries Scientist Association
- Indonesian Fisheries Student Association

For more information contact:
Conference Manager
2423 Fallbrook Place, Escondido, CA 92027 USA
Tel: +1 760 432 4270 Fax: +1 760 432 4275
Email: worldaqua@aol.com

Organized by :

ROYALINDO CONVENTION INTERNATIONAL

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