JULY/AUGUST2011
Volume 7 Number 4

AQUA CULTURE

Asia Pacific

Disease outbreaks lower shrimp supply

Climate change and shrimp farming

Asia leads in tilapia farming

From feed to marine fish in the Philippines

Using extruder for shrimp feed production

Superior fish feed characteristics

MICA (P) 008/10/2010 PPS1699/08/2011(020168)

www.aquaasiapac.com

Grow with Gold Coin

Since 1984, GOLD COIN is committed to research, sustainability and good customer service.

visit our website
www.goldcoin-group.com

At **GOLD COIN**, we are committed to provide superior shrimp feeds to ensure your business success. Using only the highest quality raw materials and manufactured under strict quality controls, we offer a range of feeds* to consistently meet the various levels of production systems. Our strict policy of opposing the use of antibiotics in our feed is congruent with the growing demand by consumers for traceability.

- **GOLD SUPREME** for superior growth and feed efficiency. Health enhancement with proprietary ENCAP® Immune enhancer
- **GOLD FORTE/GOLD VERTEX** are specially formulated for the intensive culture of white shrimp *Penaeus vannamei* in Asian conditions
- **GOLD CLASSIC/GOLD ELITE** are our flagship products that meet all nutrient requirements of *Penaeus monodon* shrimp under normal conditions
- **GOLD ROYALE** is used in highly intensive conditions by the most discerning farmer
- **ENCAP®** Hatchery Feeds have prime quality ingredients micro-encapsulated within a digestible yet water stable membrane

Some products may not be available in your country. For details on Gold Coin range of shrimp feed and other Gold Coin Aquaculture products, please contact our regional offices.

HEADQUARTERS - Gold Coin Holding Limited Sdn Bhd. Suite 9-6, Level 9, Wisma UOA Damansara II No.6 Jalan Changkat Semantan Damansara Heights 50490, Kuala Lumpur, Malaysia Tel: +603 2092 1999 Fax: +603 2092 1919 email: general@goldcoin-group.com

MALAYSIA *(JOHOR)*- Gold Coin Specialities Sdn Bhd/Gold Coin Biotechnologies Sdn Bhd, Tel: +607 237 0695 Fax: +607 236 1143 email: sp.koh@goldcoin-my.com

INDONESIA *(NORTH SUMATRA)* - P.T. Gold Coin Specialities Medan, Tel: +62 61 685 5127 Fax: +62 61 685 3452, email: p.zulkarnain@goldcoin-id.com

INDONESIA *(WEST JAVA)* - P.T. Gold Coin Indonesia, Specialities Division, Tel: +62 21 885 3668 Fax: 62 21 884 1947 email: p.zulkarnain@goldcoin-id.com

THAILAND *(SONGKHLA)* - Gold Coin Specialities (Thailand) Co Ltd, Tel: +66 74 483 600/5 Fax: +66 74 483 493 email: w.pradipat@goldcoin-th.com

INDIA *(CHENNAI)* - India- Gold Coin Biotechnologies Sdn. Bhd. India Liaison Office, No.1, B.V.R. Nagar, Alwar Thiru Nagar, Chennai 600087, India. Tel: +91 44 2486 8433 Fax: +91 44 2486 2091 email: v.ravi@goldcoin-id.com

Contents

Volume 7, Number 4 July/August 2011 MICA (P) 008/10/2010 ISBN 1793-0561

Aqua Culture Asia Pacific Online
View E-magazine
Download past issues

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

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

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

AQUA Culture AsiaPacific is published bimonthly by **Aqua Research Pte Ltd**
3 Pickering Street, #02-36 Nankin Row,
China Square Central, Singapore 048660
Web: www.aquaasiapac.com
Tel: +65 9151 2420 Fax: +65 6223 7314

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

Subscriptions
Subscribe via the website at www.aquaasiapac.com or complete the enclosed form and mail with payment. Subscriptions can start at any time. Annual subscription gives you access to download pdf and printed copy by mail. Subscriptions rate/year (6 issues): Asia SGD 70, Other zones: SGD 100
Email: subscribe@aquaasiapac.com
Tel: +65 9151 2420 Fax: +65 6223 7314

From the editor

Taking risks again?

Disease has always been the scourge of agriculture from time immemorial. Aquaculture is no different. It was not so long ago that Asia's marine shrimp industry faced the white spot syndrome (WSSV) which decimated commercial farming of the black tiger shrimp, the main species at that time. The main causes and symptoms of WSSV are well understood now. Biosecurity became essential in farms all over Asia with WSSV always looming. Often farmers are reminded it is most virulent when temperature and weather conditions are not ideal. Currently, farmers in Thailand are advised not to stock during the colder months or during the rainy season. In Vietnam's Ben Tre Province where monodon shrimp comprise 70% of the production, authorities go further. This year, with the disease situation, farms were regulated to stop stocking in April.

In Asia, the recovery from WSSV was fast as producers shifted to vannamei shrimp with readily available post larvae from specific pathogen free (SPF) brood stock. But more recently, infectious myonecrosis virus (IMNV) emerged in Indonesia in 2007. Authorities in other countries have been determined in keeping their industry safe from IMNV and officially, Indonesia is the only Asian country with this virus. If this is so, then we can rest assured that preventive measures on transfer of disease between countries are effective. However, the recovery from any disease is slow as in the case in Indonesia during the last 3 years. Walker and Briggs (2007) said that following the emergence of each of the major pathogens, there will be periods of poor productivity and reduced rates of industry expansion. Whilst pathogens are identified and characterised, diagnosis and detection methods developed, and improved biosecurity measures implemented.

Today, there are various names (EMS, liver disease, slow death) given to the infections spreading across many countries, from China to Indonesia (see page 8-9). For the farmers, this must be a nightmare situation not knowing when this will hit and what the consequences are. Technicians are also perplexed and cannot determine a pattern for these infections. Farms with high levels of biosecurity have been equally affected as those not practicing any form of biosecurity. Some in industry are attributing these occurrences to poor management practices, especially in older farms. At the same time, climate change is bringing another variable to the usual methodologies practiced in the farm. The reactions are varied. Initially, some will put the blame on post larvae while others will relook at their sanitation programme during pond preparation. Some will go further looking for herbal remedies. However, the crux of the matter is to identify the causative agent because without this, we do not know what we are up against. Is it a new virus, bacterial infection or a combination which is catalysed by lowered resistance due to weather and high stocking densities?

Farmers, feed millers, governments and NGOs are working to find out the causative agents. Some of the larger farms will have the financial resources and network to send samples to disease experts but the majority who are small and medium sized farmers will have to rely on the government. The government agencies will have to take the lead in monitoring and analysis. The analysis via sampling and laboratory work will hopefully identify the causative agent but the monitoring is necessary to determine the damage, contagion and vectors spreading this disease. To date, individual groups in the countries are working independently to find solutions. However, the problems are not country specific as it has affected to some degree all the countries in SE Asia. Governments should work together to pool resources and data in order to save time and determine the causative agent as soon as possible

Whilst we wait for diagnostic results, we ask whether despite all the efforts of governments and stakeholders to guide the industry, are farmers still taking risks? Are they ignoring standard operational procedures in the rush to produce when prices are high?

Zuridah Merican

TARS 2011

AAP is pleased to announce the first of The Aquaculture Roundtable Series (TARS 2011). The inaugural meeting will be held in Singapore, 17-18 August, 2011. The focus will be Aquaculture Feeds and Nutrition.

OUR MISSION

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

Has been presented in

AQUATIC ASIA 2011

Bitec, Bangkok. Thailand

NANOLIS

HIGH QUALITY FINGERLING FEED

made in Vietnam

Ask for a sample and discover our new micro feed under the NANOLIS range !

Ocialis

Feeding a sustainable future

Tel : +33 2 97 48 54 76 - ocialis@ocialis.evis.net - www.ocialis.com

Landmark report finds sustainably-farmed seafood holds key to future global food security

A first-ever global assessment of environmental costs of aquaculture shows farmed seafood to be less ecologically damaging than livestock production.

A new and comprehensive analysis released by WorldFish Centre and Conservation International (CI) has investigated the environmental impact of the world's major aquaculture production systems and species. Today, it offers a first-ever global assessment of trends and impacts of cultivated seafood. The analysis has found that, from the 75 species-production systems reviewed, more production means more ecological impact, but that compared to other forms of animal protein production such as livestock, aquaculture is more efficient.

The report, "Blue Frontiers: Managing the environmental costs of aquaculture", along with a companion policy recommendations paper, was released in Bangkok, Thailand at the ASEAN SEAFDEC Conference (Association of Southeast Asian Nations, Southeast Asian Fisheries Development Centre) on "Sustainable Fisheries for Food Security Towards 2020". It concludes that the demand for aquaculture products will continue to grow over the next two decades as a key source of animal protein for growing urban populations, and that the industry needs to meet this demand with improved efficiencies and reduced environmental impacts.

The key highlights of the report include:

- the environmental impact of aquaculture varies dramatically by country, region, production system and species
- a review of published information found that aquaculture is more efficient and less damaging to the environment, compared to other animal protein production systems such as beef and pork. It is likely to be among the most important sources of protein for human health and nutrition in growing urban populations in many parts of the developing world. This means that there is room for improvement, by identifying and sharing best practices, increasing investment in innovation, and strengthening policies and regulations.

Fastest growing

Driving the scientists' research was the recognition of aquaculture as one of the fastest growing food production sectors in the world: it has grown at an average annual rate of 8.4% since 1970 and total production reached 65.8 million tonnes in 2008 according to the Food and Agriculture Organization of the United Nations (FAO). Today, aquaculture is a more than USD100 billion industry that now provides more than half of all seafood consumed in the world, surpassing wild-caught seafood.

Using all available data from 2008, the study compared aquaculture's global demands across a wide variety of species groups (13), geographies (18 countries), feed types (5) and numerous production systems in use today. It allowed scientists to compare and contrast 75 different types of species-production systems, to determine their environmental impacts on acidification, climate change, energy demand, land-use demand, and other ecological factors.

Following almost two years of data gathering and analysis, researchers found, among others that;

- *Aquaculture with the highest environmental impact.* These include eel, salmon, and shrimp and prawns, due to significant energy and fish feeds required for production. These represent greatest opportunities for improvement
- *Aquaculture with the lowest/least environmental impact.* These include bivalves (mussels and oysters), molluscs, seaweed (i.e. those toward the bottom of the food chain and do not require additional feed)
- *Efficiency of salmon production methods.* While salmon production trends toward the high end of the environmental impact scale due to the use of wild fish for feed, production methods in northern Europe, Canada and Chile were found to be more efficient than those in China and other Asian countries (in terms of acidification, climate change, energy demand and land occupation)
- *Efficiency of shrimp and prawn production methods.* The cultivation in China was found to be much less efficient than other producer countries (e.g. Thailand) in terms of acidification, climate change and energy demand

"This report offers the most comprehensive analysis of global aquaculture ever undertaken, and illustrates the opportunities and challenges that lie ahead," said Dr. Stephen Hall, lead author of the report and Director General of the WorldFish Centre. "As the report points out, there must be a wider exchange of knowledge and technology, with policies and action to promote sustainability and investment in research to fill the knowledge gaps. These efforts can lead to a more ecologically sustainable industry - an important goal, if we are to meet the world's future needs and demands for fish."

With the growing demand for animal source proteins, the study also shows that aquaculture is a highly efficient food production system and has clear environmental benefits over other forms of animal food production. Aquaculture products contribute less per unit weight to global emissions of nitrogen and phosphorus than pork and beef, which reduces impact on climate change. Fish, as compared to either pork or beef, convert a higher percentage of the food they eat into consumable protein, resulting in less waste.

Looking toward the future of seafood cultivation, "Blue Frontiers" projects that global aquaculture production will continue to grow at current rates, with conservative estimates of 65-85 million tonnes produced in 2020, and 79-110 million tonnes by 2030. By comparison, 69 million tonnes of cultivated seafood were produced in 2008.

"China, India and the rest of Asia with their growing middle classes are where we can expect demand for fish to rise most significantly," said co-author Mike Phillips, a senior scientist at WorldFish. "Current trends indicate that the majority of the increase in global production will come from South and Southeast Asia, with a continued drive by major producer counties such as China and Vietnam towards export to European and North American markets."

How this rise in production will be achieved in an environmentally sustainable manner raises important issues, said Dr. Sebastian Troeng, CI's vice president for Marine Conservation. "There are a number of well-founded concerns about aquaculture, in terms of its impacts on marine ecosystems and wild fisheries. However, with global fisheries reaching alarming and unprecedented levels of depletion, fish cultivation versus wild fish capture has to be considered. We believe that intensified investment in innovation and the sharing of best practices will help us meet the growing demand while not putting unacceptable strain on coastal and freshwater environments."

CI's executive director for Indonesia, Ketut Putra, added, "With governments in the region looking to aquaculture to meet demand for animal protein, we need to better understand the environmental costs of expanding aquaculture. This report will be tremendously helpful in showing us which species and production systems we should favour to keep environmental costs down."

More information: www.worldfishcenter.org/global_aquaculture/

Stirling strain of tilapia is first to have its genome sequenced

Researchers have made a breakthrough in sequencing the complete genome of the Nile tilapia.

Using DNA from a special line of tilapia developed in the Institute of Aquaculture at the University of Stirling, the sequencing was carried out by the Broad Institute (part of MIT, near Boston in the USA). This is the first commercial aquaculture species to have its genome sequenced. The Nile tilapia (*Oreochromis niloticus*) is the most important cultured food fish globally after carp. Dr David Penman of the Institute of Aquaculture explained: "This tilapia line was developed to have two identical copies of every part of its genome (normally vertebrates show some differences between the genes inherited from the mother and father), which simplified the processing of the genome sequence data.

"The sequence and associated data are now available to the scientific community worldwide, and should contribute to further advances in both basic science and aquaculture research. For example, this should help us to find important genes affecting traits such as disease resistance, growth rate and sex determination, allowing more precisely targeted selection to improve aquaculture performance."

Professor Brendan McAndrew and Dr Penman have led research into the development of other lines of tilapia in the Tropical Aquarium facility at the Institute of Aquaculture, and these have been supplied to aquaculture operations around the world. These allow production of red tilapia, favoured in some markets, and nearly all-male populations, which prevents breeding in culture ponds before harvest. Developing such lines has taken years of research by students and staff at the Institute, with funding from a variety of sources including BBSRC and DFID.

Four-Star company in BAP program

Thai Union Group is the largest 'four-star' aquaculture operation under Best Aquaculture Practices (BAP).

Thailand's Thai Union (TUF), whose widely recognised retail brands include Chicken of the Sea, Sealect and John West, is a leading producer and exporter of frozen and canned seafood. Its four-star status reflects the top level in the BAP program, which addresses environmental, social, food safety and traceability issues at aquaculture farms, hatcheries, feed mills and processing plants. Each of the four facility types, within the aquaculture seafood production chain is designated by a star on retail packaging.

"To have a major seafood producer like TUF adopt BAP to this extent is helping turn GAA's mission of feeding the world responsibly into a reality, and we thank them for their long-running commitment," said George Chamberlain, president of the Global Aquaculture Alliance. The Best Aquaculture Practices program is a comprehensive, rigorous, metrics-based certification program for aquaculture – including farms, hatcheries, processing plants and feed mills. BAP standards cover the environment, social responsibility, animal welfare, food safety and traceability.

"Thai Union's extensive aquaculture ventures were already operating with sustainability in mind, and this will help bring even more responsibly produced shrimp and seafood to tables across the globe."

With their certification in May, TUF feed mills in Muang, Samutsakhon and Ranod, Songkhla, Thailand, became the latest additions to the list of over 400 BAP-certified facilities. The mills produce and distribute high-quality feed for shrimp and fish under names such as Profeed, Nanami and FCR. It has also achieved BAP certification for over two dozen shrimp farms in the regions of Satoon, Chanthaburi and Suratthani, Thailand. The Thai Union Hatchery Co, which operates in Amphur Takuatung, Phang-nga, Thailand, distributes vannamei shrimp post larvae to farmers.

Most of the group's seafood output is processed at the Thai Union Seafood Co. Ltd plant in Amphur Singhanakorn, Songkhla. First certified in 2006, the facility expanded its cooked shrimp production facilities in 2010 and expects to increase sales of live shrimp-based products in Japan, Europe and other potential markets. Thai Union Frozen Products Public Co., Ltd. in Amphur Muang, Samutsakorn, Thailand, also processes shrimp harvested from TUF certified farms.

At the European Seafood Exposition in May.

"The BAP four-star status fits well with Thai Union's sustainability initiatives and core beliefs of being true stewards of the environment," said Rittirong Boonmechote, managing director of Thai Union Frozen Products and president of Thai Union Feedmill. "This status allows us to provide the best possible product to our customers and will help us achieve sustainability through the whole supply chain."

News in Brief

Chinese animal feed producer to buy Vietnam livestock firm

China's animal feed producer, CP Pokphand, will buy 70.8% of CP Vietnam Livestock Co, a leading livestock and seafood company. CP Pokphand will acquire the interest from Bangkok-based Charoen Pokphand Group Co Ltd for about US609 million, 12 times CP Vietnam Livestock Co's 2010 net profit. The deal is expected to be completed before the end of the year.

In a press release, the company said that the deal is one of the largest corporate acquisitions in Vietnam. It gives a unique opportunity for CP Pokphand to acquire a controlling stake in a market leader and expand into one of the fastest growing feed and farming markets in Southeast Asia. CP Vietnam, established in 1993, has expanded its entire food production value chain, from the manufacturing and distribution of animal feed to breeding and farming of livestock and seafood, and processing and production of meat and food products. The company currently holds a 20% market share in both the commercial feed and industrial farming markets. It earned over VND20 trillion (USD1 billion) last year and posted a net profit of VND964.6 billion (USD 50.3 million).

Open ocean aquaculture in Gulf of Mexico

The US NOAA (National Oceanic and Atmospheric Administration) has released the national aquaculture policy. This paves the way for Gulf of Mexico to be the first region to develop open ocean aquaculture with a potential of 64 million pounds (29,090 tonnes) of production. Within a year, businesses can apply for the permits to culture red snapper, grouper and other finfish in the federal waters in the gulf. It is expected that there will be 5 to 20 operators with start-ups in the USD 5 to 20 million range. The US is promoting local aquaculture as it imports 84% of its seafood demand. Some 80% local aquaculture comprises shellfish oysters, clams and mussels.

Uzbek brine shrimp production facility

The Yema Group, a leading Chinese import-export company from China's Xinjiang province is looking into setting up a brine shrimp production facility in the western autonomous Uzbek republic of Karakalpakstan that borders on the inland body of water that straddles Uzbekistan and Kazakhstan. The investment will be USD2 million. The firm plans to build a production facility to harvest the brine shrimp in the Aral Sea with a capacity of 600 tonnes per year.

WWF Seafood Guide for Indonesia

The World Wide Fund for Nature (WWF) has released, 'Choose Your Seafood Right' campaign for Indonesia with three coloured codes; red for fish to avoid, yellow for fish that could be considered for consumption and green for those safe for consumption. From aquaculture, black tiger shrimp and milkfish from traditional farms, barramundi and humpback grouper, from intensive culture and ASC certified Nile tilapia are on the green list. On the 'to be considered' list are black tiger and vannamei shrimp, milkfish and tiger grouper from semi to intensive culture. In 2009, the per capita fish consumption was 30 kg/year according to the Maritime Affairs and Fisheries Ministry. In comparison, the per capita consumption was 55.4 and 60 kg/year for Malaysia and Japan, respectively. The seafood guide is available at www.wwf.or.id/seafoodguide

Bangladesh and FSMA

Under the new Food safety Modernisation Act (FSMA), shrimp from Bangladesh to the US may face mandatory testing. Currently, the US FDA tests shrimp consignments from Bangladesh at random. FSMA has updated the principles of hazard analysis critical control point (HACCP) and such testing requirements mean that exports would be unduly delayed for the tough testing measures. However, industry believes that this may not affect shrimp exports as they have already complied with the EU rules and regulations. The EU is the largest market for Bangladesh shrimp and fish, followed by the US.

Vietnamese shrimp may lose Japanese market

The alert system of the Ministry of Health, Labour and Welfare of Japan announced it has discovered two imported consignments from Vietnam containing antibiotic residues exceeding the allowed levels. One of the two consignments contained enrofloxacin at the concentration of 0.03ppm. Japan may now check 100% of shrimp consignments imported from Vietnam. Vietnamese seafood exporters believe that antibiotics are in the farming stage and government agencies need to help to control the use of these antibiotics. Japan is the biggest shrimp export market for Vietnam. In 2010, Vietnam's shrimp exports reached USD 900 million, an increase of 19% over 2009.

SGS in certification auditing team of BAP

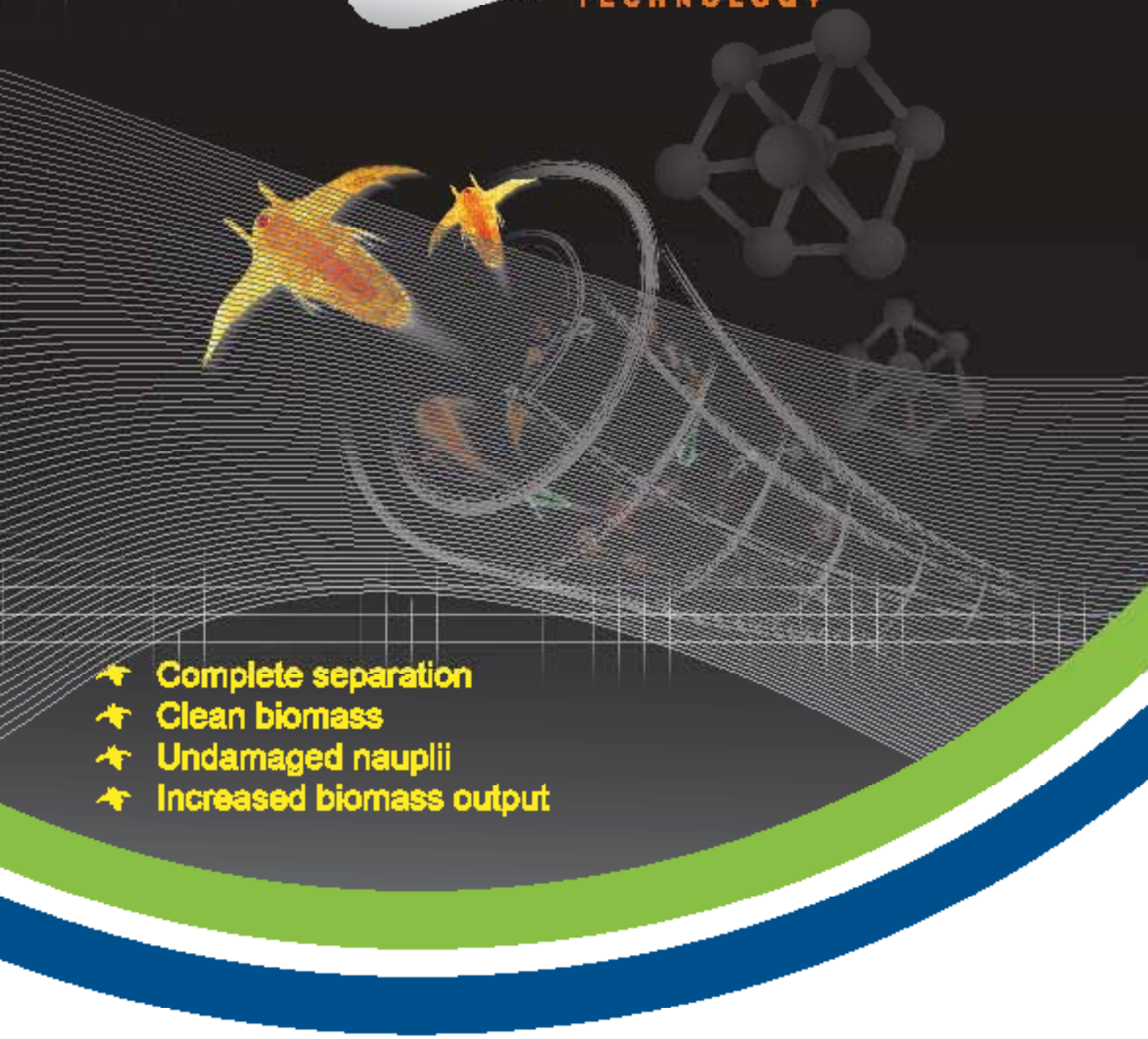
Best Aquaculture Practices, the leading global certification system for farmed seafood, has added SGS to its international team of auditing bodies. In a service agreement between BAP and SGS, the independent contractor will perform facility inspections and certification audits for aquaculture farms, hatcheries, processing plants and feed mills that apply for BAP certification. SGS is the world's leading inspection, verification, testing and certification company and is recognised as the global benchmark for quality and integrity. BAP certification audits are based on species and facility-specific international standards developed by the Global Aquaculture Alliance.

A new logo for the EAS

Since 1976, the European Aquaculture Society (EAS) has been pursuing its core objectives to promote contacts among all involved in aquaculture, to disseminate information and to promote multi-disciplinary research for the benefit of the sector. As EAS enters its 35th year, a new logo has been developed. EAS 2010-2012 President, Yves Harache said, "A more modern and highly visible logo was necessary as aquaculture is a truly global sector and as EAS also creates new partnerships with organisations that are outside of the aquaculture sector." Alistair Lane, executive director describes the logo as "A lot of people within the aquaculture community use the letters 'EAS' and so the new logo really focuses on this acronym. Many people recognise the term 'fish farming' to cover all species produced through aquaculture and the fish symbol reflects this. "

A NEW GENERATION OF ARTEMIA CYSTS

SEP Art
TECHNOLOGY



- Complete separation
- Clean biomass
- Undamaged nauplii
- Increased biomass output

INVE
www.inve.com

INVE AQUACULTURE

Industry comments...

Disease outbreaks lower shrimp supply

A higher level of crop failures from unidentified infections and inclement weather has lowered supply of vannamei and monodon shrimp in the first half of 2011.

Reports of disease outbreaks leading to inconsistent harvests in shrimp farming are common throughout Asia's intensive shrimp farming industry, but none as significant as reported in Vietnam and other main producing countries for the first cycle of production in 2011. Throughout Asia, the situation is serious and continuing, according to Matt Briggs, Vannamei 101 (pers comm). This has been happening since last year in both intensive and semi intensive farming of the vannamei shrimp and in the case of Vietnam, also with the monodon shrimp.

In **Vietnam**'s Mekong Delta, mass mortality occurs as early as 15-25 days after stocking of monodon and vannamei shrimp. Farmers called this the 'liver disease' as infected shrimp have enlarged and light yellow colour hepatopancreas with soft muscle. In less serious cases, vannamei shrimp showed slow death throughout the cycle. Fortunately, shrimp continue to grow and harvest of 30-40 pcs/kg was possible after 105 days of culture (DOC), said farmer Nguyen Van Tuy, in Soc Trang. In 2010, incidences of disease with vannamei shrimp were only 10% as compared to 40% in June this year. It was worst in January to March, said farmer Hoang Vu in Ben Tre.

In **Malaysia**, incidences of minor infections have recently reached serious levels with some farms reporting almost 80% of vannamei shrimp dying at 25-30 DOC. Farmers have termed this early mortality syndrome (EMS). Similar to Vietnam, in the less serious slow death syndrome, shrimp die at 24-40 and again at 45-60 DOC. Since November 2010, white faeces syndrome, caused by gregarines, bacteria or microsporidians (or combinations of them) is less serious and the major threat is now WSSV for **Thailand**'s shrimp farmers.

Reports from **China** on crop losses in some farming areas at the start of the year are equally alarming with symptoms such as shrinking hepatopancreas and white body, said Briggs. Losses of up to 90% of ponds in Guangdong Province and 60% in the Pearl River Delta were reported. Newer areas (Zhejiang, Jiangsu and North Fujian) faced fewer problems. In **Indonesia**, particularly in Lampung and Java Island, intensive vannamei farms faced serious mortality (80%) at 25-30 DOC and slow death occurs at 25-40 and 45-60 DOC, the latter close to harvest size (100 pcs/kg at 60 days). Dead shrimp do not surface until much later; mortality is only noticeable in feeding trays.

Looking for answers

In Vietnam, the government is taking the lead to search for causes and solutions. RIA 2, OIE and other NGOs are assisting these efforts and the results are expected soon. The help of disease experts (Don Lightner, University of Arizona, USA and Tim Flegel, Centex, Thailand) are being sought. The preliminary list of suspects include bacteria such as intracellular Rickessial types, extracellular bacteria such as Vibrios, as well as microsporidial parasites. Aquaculture experts acquainted with the varying culture and pond management practices said the situation is made worse by bad soil conditions, rains, high temperatures and inadequate aeration. In China, crop losses were attributed to cold temperatures in the first cycle.

Shrimp mortality is only detected when dead shrimp float or during sampling. As sampling is reduced to avoid stress, Malaysian farmers multiply by ten the number of dead shrimp to calculate mortality rate to adjust feeding. Karunanithi, technical consultant at Syndel Asia, quoted Professor Chalor Limsuwan who was in Malaysia recently at a seminar series organised by the company and who attributed

Shrimp with white faeces syndrome. Picture courtesy of Niti Chuchird, Thailand.

IMNV infected shrimp in Indonesia. Most countries have taken precautions to avoid its introduction into their shrimp farming industry.

EMS to blind feeding practised for vannamei shrimp. According to Karunanithi, "When farms were stocking black tiger shrimp, blind feeding was programmed for a stocking density of 25-35 postlarvae/m^2. In converting to vannamei shrimp, the feed amount was multiplied to reflect the higher stocking density. This has perhaps caused the accidental overfeeding of vannamei shrimp in our industry.

"Often, farmers do not use aeration during the first 30 days which is extremely risky when we consider that there is overfeeding. Secondly, we often see farms testing for dissolved oxygen (DO) at the feeding platform rather than at the border of the feeding area and sludge area. If there is a low DO level, it will be at the margin of the sludge area. I

Karunanithi

Haris Muhtadi

am also convinced that the build up of hydrogen sulphide is a cause of the quick mortality. Often farmers do not test for H_2S because of the apparent lack of a test kit which can detect the very low yet toxic levels (0.001ppm)." (Editor's note: See also page 10).

In the case of mass mortality of the monodon shrimp in the Mekong Delta, Hoang Vu said that the reason is the quality of the post larvae which come from infected wild brood stock which may carry diseases that were not detected by test samples. Farmers react by cleaning up ponds and restocking once or twice and if the third attempt fails, they will then stop and wait for the next cycle. In Soc Trang province, Nguyen Van Tuy, has started an enclosed nursery to culture vannamei PL5 to PL25 before stocking into ponds to build up resistance to these diseases. In Hainan, Briggs said that only 15% of ponds were stocked while some farmers have refused to stock the ponds.

Indonesian industry leaders have linked these occurrences to poor quality water and adverse environmental conditions. Shrimp Club Indonesia has advised farmers that improving and conserving water quality is critical to successful production. Farmers have started both to install settling ponds to improve water quality and to plant mangroves for seawater filtration. Slow death is also a syndrome of high stocking densities such as 150 PL/m^2, which is in turn linked to high feed usage and its associated problems with soil and water pollution, said Haris Muhtadi, CJ Feeds.

"Farmers now understand the stress created on the environment in intensive systems. They are learning to balance carrying capacity during the production cycle. Stocking density is reduced to 80-100 PL/m^2 and almost throughout Indonesia, farmers are carrying out partial harvests, three to four in each cycle depending on the pond load, starting at 70 pcs/kg. This is a large improvement and most farmers are happy with these steps as they can manage a good harvest. Added to this, post larvae from local brood stock are showing good performance. Some farmers have reported a harvest size of 40/kg or 22-23g shrimp after 100 days."

Shortfall in production

It is without doubt that these infections in Asia will bring down shrimp supplies in the first half of 2011. The infection rate is lower in the newer vannamei farms in the central and northern parts of Vietnam but in the Mekong Delta, losses are almost 90% for monodon shrimp and 40% for vannamei shrimp production in the first cycle of 2011. In China's Hainan province, production is expected to be only 40% of the volume from the same period in 2010. Thailand's first half production is expected to be reduced by 60,000 tonnes because of WSSV in eastern Thailand and floods in the south. Malaysian production is expected to drop by 30% or more as some farms faced severe losses in March and April. Indonesian production is expected to be lower as survival rates have declined to 50% in farms in Lombok and Sumbawa. In India, vannamei farms in Gujarat do not face any disease problems said Dr Manoj Sharma, Mayank Aquaculture, but production may be affected by the high demand for post larvae which may encourage parallel sales of pond raised brood stock.

Managing shrimp culture with climate change

Erratic changes in temperatures, rains and droughts are taking its toll on shrimp farming. Understanding the effects on the culture environment and managing these changes is vital for a successful crop, says Soraphat Panakorn.

Cloudy sky and impending rain

In the past few years, shrimp farming has gone through difficult times and getting a good and steady harvest has been a challenge for farmers. In Thailand, Malaysia, Vietnam and China, farmers and technicians have always suspected that these are due to the erratic weather conditions. In 2010 in Thailand, climatic fluctuations such as the hot and dry conditions brought about by El Niño have been associated with culture problems. Thai shrimp farmers experienced a serious outbreak of white faeces disease. Earlier, this disease occurred only sporadically and did not cause massive damage to shrimp crops. Since August 2010, it was the turn of the La Niña to cause abnormal weather patterns. From November 2010 to the present, shrimp in the eastern provinces of Thailand suffered from outbreaks of the white spot syndrome (WSSV). In 2010 to early 2011, China experienced a longer winter, followed by a drought. This resulted in an average loss of 50% of the shrimp crop in almost every shrimp producing area. Nowadays, getting good harvest is more difficult for farmers in Guangdong, Hainan and Fujian provinces but newer farms in Jiangsu and Zhejiang provinces are doing well. In April and May 2011, Vietnam faced out-of-season heavy rains resulting in an outbreak of a serious early mortality syndrome and over 60% of one-month old shrimp in the grow-out phase was destroyed.

The purpose of this article is to explain the effects of climate change on the culture environment. Some known strategies to overcome and restore culture conditions are outlined.

Rain and wind

Rain and wind will result in a reduction in pH, temperature, salinity, dissolved oxygen (DO_2), and pond stratification. Shrimp will rest at the sludge edge where they are exposed to hydrogen sulphide (H_2S) gas, which makes them sluggish and weak. Shrimp become more susceptible to pathogenic bacteria or viruses resulting in some mortality.

pH

The pH of rainwater is usually around 6 to 7 and this may be lower if it is located near a factory. The lower pH may lead to shrimp moulting and a drop in the phytoplankton population. The recommended solution is to apply hydroxide lime on the pond dykes to maintain pH during the rains or find a way to prevent water flowing from the dykes into the ponds as this may disturb and increase turbidity. In general, it is prudent to monitor pH frequently during the rainy season.

Low dissolved oxygen

Often when it rains, there will be cloud cover. Phytoplankton will be unable to produce oxygen but instead will be using oxygen. The different temperature and salinity can cause stratification which will prevent the penetration of oxygen. Thus, the only source of oxygen will be the oxygen generated by aeration.

The solution is as follows: Keep all aerators running during the rains. The recommended horsepower of the aeration system must be around 1 HP/400 kg. (1 KW= 1.36 HP). However, the farmer has to estimate shrimp biomass and install aerators with suitable horse power. If the rains continue daily, it is important to ensure that feed is consumed by the shrimp. Otherwise, waste feed will decompose quickly once the rains stop and the temperature rises.

It is advisable to check whether shrimp are ready to feed by dropping one check tray with 200g of feed for 20 minute before feeding time. If the shrimp consume all of the feed, then the farmer can give the full amount. If not, it will be better to wait and check again until shrimp are ready to feed actively.

WHO CARES?

Who cares that one extra fish, one extra shrimp, or improved survivability, will make the difference between profit and loss in the aquaculture world this year?

Alltech does!

In fact, so do the 2,300 people worldwide, committed to producing and managing the Alltech range of patented, high quality, safe and natural ingredients that improve feed quality, animal health, food safety and industry profitability.

Supported by 30 years of research, 150 PhD theses, 70 masters' theses and over 300 reviewed papers, Alltech ingredients are proven to promote animal health and performance through better nutrition ...*naturally*

So the next time you ask the question, who cares? Remember at Alltech…

WE DO!

Alltech®

Nutrition, health, performance ...*naturally*

For more information on Alltech Aqua Solutions, email: aquasolutions@alltech.com or contact your local Alltech representative.

www.alltech.com

Floating dead shrimp

Severe mortality after rains

Picture showing the white mud protective film

Long arm aerator and testing for dissolved oxygen

Stressed shrimp after hydrogen sulphide exposure

Low temperatures

Usually, low temperatures will force the mainly weak shrimp to stay at the sludge edge as it is warmer there. However, this will expose shrimp directly to toxic gases. Feed consumption will be reduced and if the farmer does not make the necessary adjustment, the result is that waste feed will cause water quality problems after the rains. Also, the feeding gap between meals will be longer when temperatures are lower. During this period, microorganism activity is also reduced, which in turn means that organic matter will accumulate more. This will be a time bomb when the weather becomes hotter.

A solution is to adjust feed according to temperatures (Panakorn, 2011). Again, we recommend the application of hydroxide lime ($Ca(OH)_2$), or hydrated lime or burning lime (CaO) on sludge area to keep shrimp away from this area.

Lower salinity

Actually, it is the sudden reduction in salinity which is harmful to the shrimp as this affects shrimp health. Shrimp are stressed and will be easily infected with pathogenic bacteria in the ponds. This can be resolved by draining out the top water as freshwater with a lower density will remain on top. Minerals, lime or marine salts should be added during long periods of rain to maintain the optimum mineral level to help shrimp to moult. Carbonate lime will help to maintain optimal alkalinity, oxide or hydroxide lime will provide conditions for optimal pH. Marine salts should be placed in a shrimp feed bag and hung 10 cm from pond bottom.

Strong winds and noise

Strong winds of more than 15 km/hr can create waves on the pond surface as well as in the water body. Normally the sludge surface will be covered with organic matter that is completely oxidised by available oxygen. This white to gray colour layer works like a film or plastic sheet buffering the toxic gases contained below. The inner layer which is incompletely oxidised (anaerobic) is black in colour and this layer producers hydrogen sulphide . When the strong wind blows, it disturbs the equilibrium and the harmful gases are released.

When rainwater drops onto the water surface, it creates noises that annoy shrimp and forces them to consume less feed and also to swim down to the bottom of the pond where there is high accumulation of toxic gases and lower dissolved oxygen. Some of these shrimp will be stimulated to moult by the low pH and this process uses oxygen at more than 1.4 times that of shrimp not in a moulting condition. Mortality with soft shell will follow after the rains.

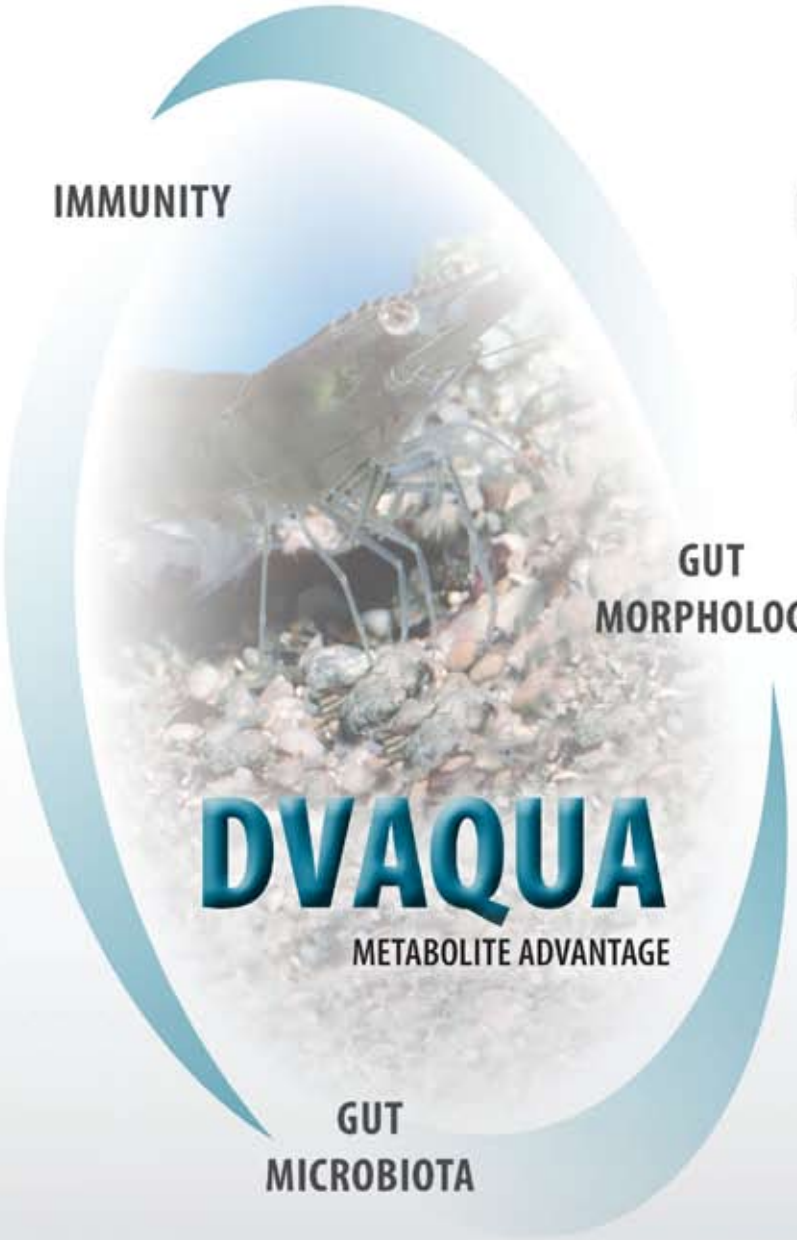
The solution is to again apply hydroxide or oxide lime on the sludge edge to create an extreme alkalinity that will push shrimp away from the sludge edge and at the same time reduce the toxicity of H_2S gas. (Toxicity of H_2S will be 100% at pH5 and 0% at pH10). It is also advisable to avoid feeding when it rains. In Thailand, long arm aerators are common and highly recommended! Long arm aerators not only supply oxygen to water but also the currents ensure that organic matter settles in the pond centre. This provides a larger and wider feeding and living area along the periphery. The sludge pile will stay separately and once the winds come, the problem will be less when compared to a pond with an evenly spread sludge.

Cold weather conditions

Since shrimp is a cold blooded animal, its metabolism will depend on the temperature of its environment. Low temperature increases the virulence of viral disease, especially WSSV. Based on his research, Prof Chalor Limsuwan, found that WSSV is more virulent when the temperature is lower than 28°C and it can be eliminated at consistently high temperatures of more than 31°C for 7 days.

Feed demand, digestibility, immunity and nervous system activity will be lower when temperatures drop. Shrimp is able to adjust to a gradual drop in temperature but not sudden drops. Farmers should avoid any culture in extreme season or else they need to provide a proper solution

Balance Their Immune System for Health and Performance.



The benefits of a balanced immune system and improved intestinal function include:

- **HEALTH AND DISEASE RESISTANCE**
- **YIELD AND SURVIVABILITY**
- **FEED DIGESTIBILITY AND EFFICIENCY**

That's why you need DVAQUA®. The unique nutritional fermentation metabolites in DVAQUA support robust digestive health by balancing gut microbiota, the immune system and optimizing gut morphology.

In fact, performance results of our aqua research trials* consistently prove that feeding all-natural, science-based DVAQUA is the smart, healthy decision.

DVAQUA® | Diamond V®
Research Tested. Performance Proven.™

MADE IN USA

For more information, call +66 2730 3251 or visit diamondv.com

Sludge area in a pond in Thailand

Plankton crash

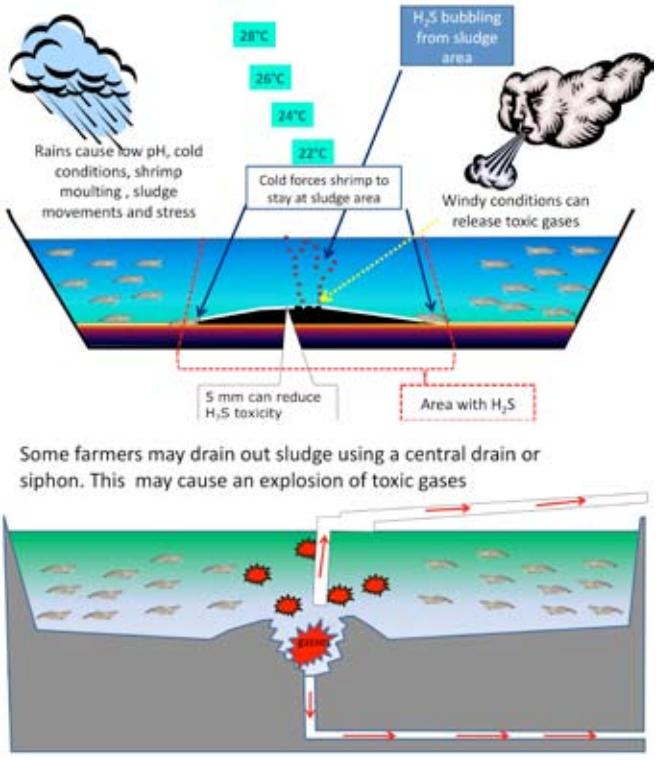
to buffer this extreme condition, such as covering the pond with a plastic sheet to keep the temperatures higher in the pond environment.

During colder periods, shrimp may show lower average daily growth (ADG), high feed conversion ratios, and will be more susceptible to infection by pathogenic bacteria and viruses. Symptoms manifested include: size variation, unexplained gradual mortality, white muscle disease syndrome, sluggish movement and stunted growth. Every time, cold winds occur, I would strongly recommend to check feed demand before applying feed.

The best way is to reduce feed amount even though the shrimp is able to finish the feed in the feed check tray. Usually at 18°C shrimp will still consume feed if temperatures drop slowly or if this temperature is the normal condition but the amount will be only 10-20% of optimal feed demand. This will not be the case if there was a sudden drop. Additionally, when there is a sudden drop from the optimum temperature (28-30°C) to only 22°C shrimp will definitely stop eating.

Hot conditions

In reverse, when the weather is cold, once the shrimp is exposed to hotter weather conditions above 32°C, the feed consumption rate will increase. Prof Chalor Limsuwan and his research team observed that fast eating and excretion lowered digestibility and absorption. In addition, some shrimp will move fast, thus consuming energy at the expense of growth. In such cases, the organic load in the pond will increase and act as a food source for microorganisms that thrive under high temperatures. Water stratification occurs with higher temperatures on top and lower temperatures at the lower and bottom



layers, if the aerator is not operating. Eventually, this situation will cause oxygen deficiency at the pond bottom where most of the shrimp will be resting to avoid exposure to the hotter top layer. But at the same time, lower oxygen levels will encourage anaerobic activity of microorganisms which will result in the production of toxic gases.

Altogether, hotter conditions tend to result in overfeeding, fluctuations in water conditions, pH swings, oxygen shortages, over bloom of phytoplankton and consequently plankton crashes, harmful toxic gases, higher salinity due to evaporation and increase in *Vibrio* and other pathogenic bacteria. *The final outcome is a failed crop!!*

It is best to continue feeding to actual demand and not depend on the feed check tray as is commonly done during hot weather. It is also better to avoid feeding under hot conditions and adjust feeding time to the early morning, late afternoon or feed more at night. Another indicator is water transparency. If this is lower than 30 cm, it indicates that shrimp has been overfeeding for the last 2 to 4 days. It is also recommended to keep the water level high as the aerator can provide oxygen to the bottom. A long arm aerator with 1.5 inch dip, 80-90 rpm can diffuse oxygen down to 1.1-1.2 meters from the surface.

In addition, the oxygen level at the sludge edge or within a foot (30cm) from the bottom must always be over 4 ppm. Even on sunny days, it is advisable to continue aeration. If the phytoplankton population drops, the farmer must immediately apply hydroxide lime to maintain pH and continue full aeration as remedial action

Related article

Panakorn, S., 2011. Effective feeding in shrimp culture. Aqua Culture Asia Pacific, Volume 7, Issue 2, March/April, pp8-13).

Soraphat Panakorn is Technical Sales & Support Manager, Novozymes Biological Aqua Business unit, Asia Pacific Region. His message in this article is that farmers should be able to adapt and control culture conditions quickly as climate change is out of their circle of control. He welcomes feedback from readers.
Email: january161975@hotmail.com

Diversification to raise national aquaculture productivity

Santeh's move into farming of marine finfish and seafood marketing is to drive industry towards higher levels of productivity and value.

Phillip Ong has been the president and CEO of Santeh Feeds since it was established in 1990. He has led the company to its present status through his innovative ideas, passion for the industry and by supporting various activities of the government, research institutions and academia. He is credited to be a prime mover of the industry.

Organic growth in the past 20 years has made Santeh Feeds Corp a key player in the Philippine aqua feed sector. Production now covers more than 13 aquatic species and, leveraging on its strength in the research and development, the company has developed feeds for four species of high value marine fish and for mud crab. With the latest development of feeds for the siganids, Santeh continues to show its strength in the Philippine aqua feed business - a highly competitive one with several strong players, particularly in the production of extruded fish feeds.

Diversification into fish farming and seafood marketing since 2004 is part Santeh's strategy to contribute to the development of aquaculture industry in the Philippines and be a key player in the industry. The goal is to push for higher productivity levels and support production with marketing.

Mariculture is important for the Philippines, which has extensive protected coastlines and is close to China, a large market for high value marine finfish. However, there are both technical and financial limitations preventing the quick expansion of this sector. The groundwork was laid out by the Bureau of Aquatic Resources (BFAR) which has identified 60 mariculture parks in several locations throughout the archipelago. Seeking to spur investment in near shore and off shore cage farming,

20 years of growth

Santeh Feeds Corp started feed production in 1990 with a feed mill in Lawang Bato, Valenzuela producing pelleted feeds for freshwater fish, namely tilapia and milkfish. Today, it is one of the leading aqua feed producers in the Philippines. This position was enhanced with the production at its state-of-the-art Calumpit, Bulacan plant, operational in 2001. It also expanded production with a second feed mill in Polomolok, in Mindanao to produce feeds for grow out of fish, shrimp, nursery fish and pet feeds.

At present, the product range is led by various brands of pellet and extruded feeds comprising feeds for the milkfish, tilapia, pompano, grouper, snapper, seabass, cobia, siganids, marine shrimp, crab, clarias and pangasius catfish, koi and tropical fish.

Several industry firsts

The company is credited with a few firsts. When vannamei shrimp production was permitted in 2007, it was far ahead with the Tateh brand of vannamei feeds. It was already well known for its premium partially extruded feeds for the monodon shrimp to impart a higher level of water stability. The same processing technology is used for the vannamei shrimp feeds formulated for intensive farming. This was later followed by floating feeds for the Clarias and Pangasius catfish, designed for shallow culture systems such as ponds and tank systems. The demand was in Mindanao where Santeh shared culture technology with farmers diversifying into pangasius catfish farming. There are also the highly specialised slow sinking feeds for the pompano *Trachinotus blochii*, seabass *Lates calcarifer*, red snapper *Lutjanus argentimaculatus* and green grouper *Epinephelus coioides*. The most recent addition is floating feeds for the monoculture of the two *Siganus* spp in ponds, pens and cages.

Since 1997, the company has been an industry leader when it became the first to be certified ISO 9002:1994. It was also the first to have the ISO 14001:1996 and ISO 18001:1999 for environmental responsibility in the aquafeed industry.

Fishery school on the air

Santeh is recognised for its contributions to the aquaculture industry. In particular, the 'Fishery School on the Air' is where issues on specific aqua specie such as tilapia, bangus, sea bass, and pompano are discussed in Tagalog over the radio. This has reached its eighth year and Ong said that a web company was interested in compiling these into a video. It also gives educational grants in Fisheries at various universities and colleges such as the Central Luzon State University, Mindanao State University, Cagayan State University and UP Visayas.

BFAR and the private sector have also established several multispecies hatcheries such as one in Bohol in the south.

This was an opportunity for Santeh to be a key player in the country's marine fish farming business. **Phillip Ong**, president and founder of Santeh Feeds Corp said, "Three and a half years ago, in partnership with an old friend, we began the grow-out of the pompano, snappers and groupers in offshore cages in Central Luzon. Fish are exported to Hong Kong and the US. Today, we have a three-way partnership where we provide the feeds and culture technology, and BFAR provides the culture area and assesses the environmental impact of the farming activity, along with the required export permits, regular monitoring of the area and technical support for disease monitoring. And finally, our partner does the marketing of the products. With this successful partnership, we now seek investors for other mariculture parks in the Philippines."

The Santeh team also saw bottlenecks to further growth. Upstream it was with nursery feeds and downstream, marketing of the fish. These became opportunities for the company to diversify.

Nursery feeds

As demand for quality fingerlings increased, it was observed that several of the multispecies marine hatcheries could not increase their output. The bottleneck was during the pre-starter feeding stage. While larval feeding starts with mash or crumbles, the most suitable feeds for the next stage which meets the nutritional requirements of the fry are high quality, micro extruded feeds imported from Taiwan or Japan. These high-end feeds are costly for the nursery operators and, in the absence of cheaper local alternatives, operators usually continue with mash or crumbles despite various difficulties such as in handling the feed, feed wastage and water pollution.

Phillip Ong (left) was in Shanghai at the Asian Fisheries and Aquaculture Forum 2011 in April, supporting the Philippines team. From second left, Prof Ida Saison, past president Asian Fisheries Society, Remedios E Ongtanco, Ceso III, director region III, BFAR, Patricia Rico, vice president for sales and marketing and Dhonna Noriega, marketing assistant to VP, Santeh Feeds

Ong said, "Initially, it was difficult for us to embark on producing these specialised feeds of one mm size extruded pellet with high digestibility but we knew that this was a necessary step for the further development of the sector. We needed to find ways for hatcheries to increase their productivity and to be able to supply sufficient fingerlings to farms.

"In the feed mill, our expansion is now focused on the production of these extruded nursery feeds. We have begun marketing in the Philippines and will gradually expand to regional markets. We started

this in the first half of 2010. Feeds are competitively priced at 15% lower than imports. We are glad that we have managed to capture some of the market share of imported pre-starter feeds."

Seafood marketing business

Ong realised that the marketing of marine fish was skewed towards that of lower quality fish at lower prices. Because of the control on fish distribution and competition among traders, the common practice is for traders to buy only standard quality fish at lower prices to bring to markets. This was sustainable when almost all products were of uniform quality but as production protocols improved, better quality fish would come into the market. These producers could not reach markets, as they demand higher prices. Currently average quality live green grouper is sold at PHP 560/kg at local supermarkets.

"Fishta Seafood Division was set up in 2004 to provide logistics operations for producers to market their fish direct to consumers. We saw that although some farmers are working hard to improve the quality of fish produced, they are at a disadvantage during the marketing process. We decided that by helping our clients to market their fish directly to the supermarkets, they benefit with better prices that commensurate with their efforts to produce quality fish. We also provide clients with the best product quality. This is win-win situation as consumers get quality products at lower prices and farmers have a ready market for their products."

Today, Fishta Seafood handles the harvesting direct from the farm and distributes produce to major fish markets in Manila as well as to hotels, restaurants and supermarkets. The division also pioneered the display of live fish in aquarium tanks in major supermarket chains and seafood markets.

Core business is quality feeds

Similar to other aqua feed companies in the Philippines and the region, Santeh feels the impact of high raw material prices on production costs. However, in the case of shrimp feed prices, Ong said that they have maintained selling prices.

"It was not possible to pass on the extra costs to the producers as we needed to support the industry. In the case of the Philippine shrimp industry, production is consumed locally and higher international prices do not benefit farmers."

Nevertheless, Santeh was quick to tap on new opportunities in feed production such as in the production of feeds for the popular siganids. In 2008, Mindanao State University in Naawan, Mindanao began the commercial production of the siganid fry, adding to the only existing hatchery at SEAFDEC in Iloilo. Santeh was ready with culture technology and feeds. The availability of hatchery production of fingerlings meant that production is no longer limited to some seasons. The R&D team at Santeh developed the feed based monoculture protocol in ponds, pens and cages, moving away from the traditional polyculture with milkfish and saline tilapia, with siganids grazing on filamentous algae for feed. They have also addressed the concern that the feed quality, quantity and digestibility of the floating feed must be precise at certain stages as the fish has a sensitive gut system.

"We are very optimistic on the potential of aquaculture in the Philippines. We will continue to search for new developments and this is our small contribution to the country. At the same time, developing markets in other regions is our future thrust, just as we saw the upsurge in consumption in Mindanao and went to develop mariculture in Northern Mindanao."

Blue revolution with fish meal reduction

By Serge Corneillie and Keith Filer

Solid State Fermentation enzymes can reduce the fish meal inclusion up to 65% in fish feed giving same or even increasing performance in herbivorous and carnivorous fish.

In the animal feed industry, the use of enzymes is very common. Today the global feed enzyme market is worth more than USD 550 million and saves the global feed market an estimated USD 3-5 billion per year. However in fish feed, the use of enzymes has been limited until now, although several reports show the benefits of adding phytase. Some global fish feed companies claim that they have been trying for years to use traditional enzymes in order to replace fishmeal with plant proteins but with very limited success.

However, over the last 2 years Alltech, USA has shown that with a natural enzyme complex (SSF, Solid State Fermentation), fishmeal content can be reduced in fish diets up to 65% in both carnivorous and herbivorous fish, whilst keeping the same or getting even better growth performance compared to high fish meal diets. In red sea bream, Satoh et al. (2010) reduced fish meal from 50 to 20% and replaced with ordinary corn gluten and soybean meal. The addition of 500g Allzyme® SSF per tonne of feed resulted in the same performance as a 50% high fish meal diet. Similar or better results were obtained in tilapia, European sea bream, pangasius and amberjack.

Fish have limited digestive capacity for plant proteins

Plant proteins and other ingredients can replace the fish meal component in fish feeds. One of the major constraints to their use is the low digestibility of the plant proteins, brought about by high levels of non starch polysaccharides (NSP), cellulose, hemicellulose, pectins and xylans which cannot be broken down by the digestive enzymes of many fish species especially carnivorous species.

Furthermore plants such as soybean have many anti-nutritional factors such as lectins, saponins, oligosaccharides, etc which need to be removed before they can be used in fish feed.

When high amounts of plant proteins are used, depending on the fish species, amino acid supplementation is often needed, such as methionine and lysine in soya protein concentrate (SPC). In some cases taurine, a sulphur amino acid is also required.

Different ways to reduce fish meal in fish feed

Due to the very high fishmeal prices (USD 1760/tonne in April 2011), many fish feed companies are producing fish feed with reduced levels of fish meal by replacing higher and higher levels of fishmeal with highly digestible processed corn gluten and processed soybean meal such as low-antigen SPC). In Japan, it has been down by 30-40% fishmeal. Clearly, this is a very positive development as it supports the sustainable use of fish meal. However processed corn gluten and soybean meal are quite expensive and economical savings are relatively low.

A much more economical way is to use ordinary soybean and corn gluten meal, but therefore more versatile and powerful enzymes are needed to increase the digestibility of these plants and reduce the anti-nutritional factors. Traditional enzymes mixtures cannot achieve this.

Solid State Fermentation enzymes

Traditionally enzymes are produced by conventional liquid fermentation which produces a single enzyme. Different enzymes produced by individual liquid fermentation are mixed in a enzyme cocktail but often there is very poor synergy in their action which leads to unsatisfactory results especially in fish. Over the last 10 years Alltech developed a technology which produces a natural complex of enzymes by using solid state fermentation (Allzyme® SSF). This is based on the same natural way as termites turn wood in sugars by growing fungi in their nests.

Allzyme® SSF (Alltech Inc.) is produced by solid state fermentation using the naturally occurring non GMO fungi *Aspergillus niger*. As the fungus grows rapidly it secretes enzymes to break down the solid media substrate which then releases the nutrients it requires for subsequent growth. When this particular fungi is grown on wheat bran hundreds of enzymes are expressed of which seven enzymes are guaranteed in the Alltech Allzyme® SSF product (a-amylase, cellulase, phytase, xylanase, (beta) 3-glucanase, pectinase and protease).

In feed, these enzymes work synergistically to break down different substrates such as protein, cellulose, pentosans, phytic acid and even starch and fat to effectively improve the overall diet digestibility and improve the availability for absorption of dietary nutrients. In addition, many anti-nutritional factors are broken down by the enzymes.

Carnivorous fish: red sea bream

Recently Satoh et al. (2010) performed an experiment in which juvenile red sea bream (13.5±2.4g) (RSB) were fed six different diets (Table 1).

Table 1. Composition of the six experimental diets.

Diet	1	2	3	4	5	6
	FM50	FM20	FT	FTP	FTE 0.05	FTE 0.1
Ingredients						
Anchovy meal	50	20	20	20	20	20
Soybean meal	0	18	18	18	18	18
Corn gluten meal	5	23	23	23	23	23
Fish oil	5	5	5	5	5	5
Soybean oil	5	7.4	7.4	7.4	7.4	7.4
Ca(H2P04)2	1	1	1	1	1	1
Taurine	-	-	0.2	0.2	0.2	0.2
Phytase(IU/g)	-			1000	-	-
SSF	-	-	-	-	0.05	0.1
Others*	34	25.6	25.4	25.2	25.35	25.3

Others: Starch, vitamin and mineral premix and wheat flour

RSB were fed with a high fishmeal diet (Table 1, diet 1, 50% anchovy meal) as control and 5 other diets all with low fishmeal inclusion (20%) but to which different components were added (taurine, taurine and phytase enzyme, taurine and SSF). The fishmeal was replaced with ordinary corn gluten and soybean meal. Diet 2 was low fishmeal, diet 3 was low fishmeal and taurine, diet 4 low fishmeal and taurine and phytase enzyme, diet 5 was low fish meal and taurine and 500g SSF/tonne feed and diet 6 low fishmeal and taurine and 1kg of SSF/tonne feed.

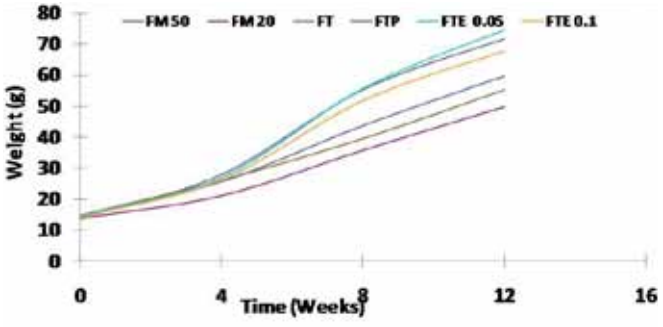
Table 2. Effect of treatments on the performance of RSB after 12 weeks.

Parameter	Treatments					
	FM50	FM20	FT	FTP	FTE 0.05%	FTE 0.1%
Final BW, g	71.5^{c}	49.8^{a}	55.2^{ab}	59.7^{ab}	74.5^{c}	67.8^{bc}
Weight gain, g	57.7^{b}	35.9^{a}	40.4^{ab}	45.4^{ab}	59.9^{b}	53.7^{b}
SGR, %/d	1.96^{c}	1.52^{a}	1.57^{ab}	1.70^{ab}	1.94^{c}	1.87^{c}
FCR	1.12^{a}	1.30^{b}	1.27^{b}	1.25^{b}	1.16^{ac}	1.21^{ac}
Feed intake, g/d	64.7^{a}	46.6^{b}	51.2^{ab}	56.6^{ab}	69.6^{a}	64.9^{a}

^{a,b} Means differ P<0.05.

The best performance was obtained with the highest fishmeal diet (best growth and lowest FCR). However the lowest fishmeal diet

Figure 1. Growth of RSB fed different diets high or low in fishmeal.



plus 500g SSF showed equal growth and equal low FCR as the high fishmeal diet (FCR: 1.16 versus 1.12). The lowest growth and highest FCR were obtained with diet 2 (low fishmeal). Adding taurine alone or taurine/phytase to the low fishmeal diet improved the performance but performance was still much lower than the high fishmeal diet. Adding very high amounts of enzymes (1 kg of SSF/tonne did not further improve the results).

Furthermore, results in the same study show that phosphorus retention was significantly increased in the diet 4 and diet 5 and 6, indicating that both phytase and the phytase component of Allzyme SSF were giving equal performance as the phytase enzyme added to diet 4. Taurine retention was also increased in the group fed the SSF.

These results show clearly that highly carnivorous fish (RSB) can be fed with low fishmeal levels and that ordinary plant proteins can be used if proper enzymes are added. Field trials over the last 2 years with RSB, amberjack have confirmed these results. In Europe, these results were repeated in European sea bream (Nengas et al. , 2010).

Herbivorous fish: pangasius and tilapia

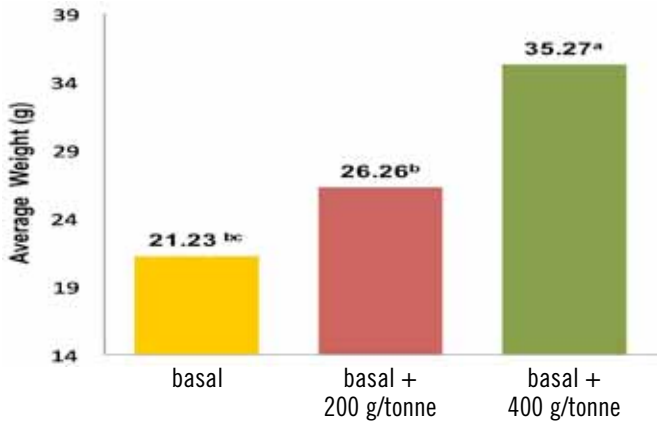
It is strongly believed that herbivorous fish can digest plant proteins better than carnivorous fish and therefore do not need additional enzymes in their diets.

Surprisingly in non-carnivorous fish such as tra catfish, using Allzyme SSF, better results were found. Hung et al. (2008) compared a 15% fish meal diet with a 5% fish meal diet (65% reduction) and added SSF enzymes (200 or 500g per tonne feed) to both diets. Clearly, a 15% fishmeal diet gave better growth and lower FCR than a 5% fishmeal diet but adding only 200g SSF/tonne to the low fishmeal diet improve the performance to the same level as the 15% fishmeal diet. Moreover, adding 500g SSF/tonne nearly doubled the growth compared to the high fishmeal diet (56g growth compared to 31g). An interesting observation was that adding SSF to the higher fishmeal diet further improved the performance of the high fishmeal diet. But there was no difference in performance between a low fishmeal diet with 500g SSF and a high fishmeal diet with 200g SSF/tonne addition. Hence, a low fishmeal diet with 500g SSF/tonne is more economical.

In an experiment with basa catfish similar results were obtained. Adding SSF improved the performance in both the low and high fishmeal diet. On the other hand there was no difference in performance between a low and high fishmeal diet without any enzymes added. This could mean that enzyme systems are very different between different fish species. Basa catfish seems to be able to digest very well very high plant protein diets, better than the tra catfish.

Tilapia

In the Tilapia, a commercial diet (with zero percent fish meal) was used as a control group. Fish of 3g were fed with the control diet or with the control diet to which 200g SSF/tonne (diet 2) or 400g SSF/tonne (diet 3)



was added. After 2 months, the 3g fish reached 21.3g with the control diet, 26.3g with diet 2 and 35.3g with diet 3; which shows that adding only 400g SSF/tonne feed nearly doubled the growth (18 versus 32g weight increase).

Other fish

Test with gibel carp in China, pangasius in Indonesia, amberjack in Japan, all showed the capacity of SSF enzymes in the reduction of fishmeal in fish feeds.

Limitations

Enzymes depend very much on the temperature, and we have found good results with Allzyme® SSF when water reaches 18°C and more. Further work need to be done on low temperatures.

Conclusion

It is apparent that fish have enzyme systems that are much less developed than higher mammalians, which could be the main explanation why adding powerful complex enzymes gives such a strong increase in performance. This is the first time that a sustainable and economical alternative for very expensive and scarce fishmeal has been proven on a wide scale. Nevertheless, further work needs to be done to find best application methods (liquid SSF) and to extend these results to cold water species.

References are available upon request.

Serge Corneillie

Keith Filer

Serge Corneillie, PhD is general manager, Alltech Japan. Email: scorneillie@Alltech.com

Keith Filer, PhD is the aquaculture research manager for Alltech. He is involved in enzyme production and research as well as managing the Asia-Pacific Biosciences Centre. Recent research has focused on the application of enzymes in the aquaculture industry.

Extruded shrimp feeds: considerations in production

By Joseph P. Kearns

Production of shrimp feeds is a demanding and always changing method of producing a specialised feed for a highly sought after food. Methods of raising shrimp vary greatly all of which adds to the wide variation and experiences with regards to this husbandry system.

Recently in New Orleans at the Aquaculture America Conference in a special session of the American Feed Industry Association, it was stated that shrimp and chicken husbandry are similar. Similar in the fact that shrimp are now undergoing the rate of change seen when chicken production was ramped up some 30 to 40 years ago. All methods of production are under scrutiny to insure safe marketable shrimp at an affordable price. Dr. Addison Lawrence of Texas A&M University mentioned he believes shrimp will become the 'Chicken of the Sea', an affordable product easily obtained at your grocery much like chicken today. If this is going to occur then the feed industry will need to develop affordable and effective feeds.

Pellet mill technology has been the dominant method of shrimp feed production, a simple and low cost investment to get into sinking aquatic feed production. There is a difference between low investment cost for machinery and total feed cost when producing feeds. In the case of shrimp feed production, extrusion has advantages that outweigh the lower cost machinery solutions. Most of these reasons relate to the ability of the feed formulator to use a wider range of ingredients and achieve a lower cost complete diet. A main point in this discussion is the fact that *Penaeus vannamei* (Pacific white shrimp) is the predominant shrimp raised in Central and South America as well as Asia. There are good sources for pathogen free shrimp post larvae and these animals accept a vegetable protein based diet readily.

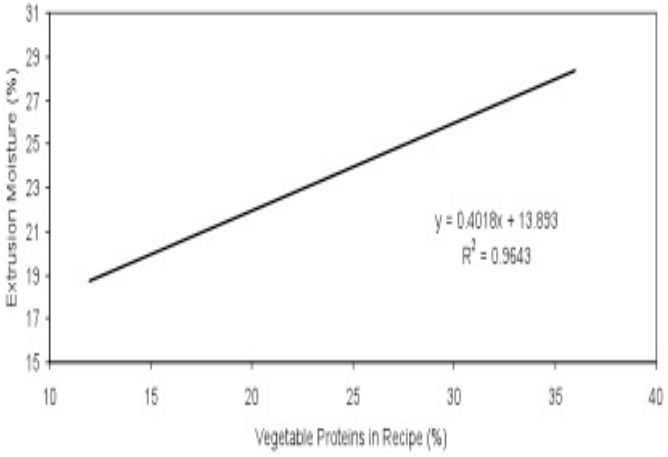
Penaeus monodon (black tiger shrimp), a more carnivorous species, consume feeds also produced by extrusion but these diets have limitations with regard to vegetable proteins. These two species of shrimp account for approximately 80% of all farmed shrimp worldwide. Asia produces nearly 75% of all farmed raised shrimp led by China and Thailand with Vietnam, Indonesia, and India close behind. Latin America with Brazil, Ecuador and Mexico as the major producing countries contribute nearly 25%. Thailand is the largest exporting nation for farm raised shrimp.

What can an extruder do that a pellet mill has a difficult time achieving?

Adding elevated amounts of water

Water just happens to be a key ingredient when making elevated vegetable protein formulations. These diets have proven to be very effective in shrimp culture and the results show this especially for *P. vannamei*. Elevated water levels are needed in the extrusion process for proper processing to achieve the characteristics required in the finished feed (Figure 1).

Figure 1. Relationship of water needed for elevated vegetable proteins during extrusion.



Making small diameter feeds

Extrusion cooking has shown, with the proper preparations, that a feed can be made in ultra small diameters. It is possible to make 0.8mm shrimp feeds with extrusion cooking on a properly equipped single screw extruder. A feed producer in the US is marketing a shrimp feed starter diet which is 0.4 mm and made on an extrusion cooker. This just happens to be a specialised twin screw extruder with self wiping screws and a very positive material movement extruder barrel (photos 1 and 2).

The conditions required are good grinding where the raw material particles are a minimum of 1/3 the final die opening. For example on a 0.8 mm shrimp feed, the raw materials all need to be less than 266 microns. Fine grinding needs to be coupled with conveyors, screeners, equipment designs and devices to support such small pellet production.

An additional advantage of extrusion of small diameter pellets is the number of pellets per kilo in the finished feed. Advanced grow out technology is improving and changing. Some of these changes show that increasing feeding times per day gives improved growth results. This primarily centers on super intensive indoor systems. Feeding regimes still hold at about 3 to 4% of the biomass in the system. This coupled with the number of shrimp in the system show that more pellets per kilo gives a better more even number of pellets for each and every shrimp.

Do the calculations, weigh out a number of pellets and you can figure the pellets per kilo and how this effects the number of feedings per day based on the number of shrimp in your system. Would you want 1 pellet per shrimp every now and then or 2 to 3 pellets per shrimp per feeding?

Photo 1. Shrimp feed through a 0.8 mm die hole. Single screw extruder.

Photo 2. Shrimp starter diet 0.4 mm. Twin Screw Extruder.

Making feeds that hold together in water without binders is problematic for a pellet mill which is not the case for extrusion cookers. Extrusion cookers generally require in the area of 10% starch in the formula for sinking feeds and 20% starch for floating feeds. This can vary slightly based on the total formula. This is a huge benefit for extrusion cookers. If a formulation requires elevated starch levels or binders, many times in the 25 to 30% range, as for pellet mills on shrimp feeds, then you have reduced ability to use least cost formulation techniques. Why?

Vegetable proteins are usually lower in protein than fish meal. Lower level of protein means you need increased levels in the feed formulation to achieve a minimum protein level. Typically a 35 to 40% protein level for shrimp feeds. Do you want to play with 90% of the formula or do you wish to have movement in only 70% of the formula? Raw materials are the most costly factor in feed production. The additional cost of extrusion equipment becomes relatively minor when this factor is studied and included in the total cost equation.

Having reviewed the three most important reasons for use of an extrusion cooker in shrimp feed production, let's review the advancements in extrusion that moved this technology forward on small diameter feed production. What would be the three biggest recent developments in shrimp feed equipment as far as extruders are concerned?

Photo 3. Material from HIP Preconditioner, 50% fresh meat, 11.5% steam, 3.4% water total of 35% moisture.

Newly developed preconditioners

Conditioners that can elevate moisture levels to heights never seen before and still have a free flowing powder into the extruder barrel. Referred to as 'the most significant preconditioning development for extrusion cooking in the last 20 years,' the new Wenger High Intensity Preconditioner (HIP) provides a level of mixing intensity that makes it the perfect complement for high capacity extruder designs. Two independently driven shafts offer both speed and rotational direction control for a wide range of capacities, mixing intensities and retention times.

This high intensity design produces more uniform hydration and heating of the recipe and allows the increased addition of liquids in the recipe, not to mention increased levels of hygiene and food safety. As mentioned, more vegetable proteins in shrimp feeds require higher levels of water applied evenly and effectively (photo 3).

Advances in extruder barrel

Extruder barrels have advanced in both single screw and twin screw applications. It is not unusual now to see pellet mill densities out of an extrusion cooker. Tests have shown with the proper configuration, densities of 700 g/l have been seen in twin screw shrimp feed trials. Single screw technology is now normally in the 625 to 650 gm/l range.

Not only are densities up but capacities as well. Capacity was the single most important development for renewed interest in extrusion for shrimp feeds. Who wants to make 2 to 3 tonnes per hour even with formulation advantages? Who wants to make in the 8 to 10 tonnes range with all the advantages mentioned earlier? Basically it was a system approach to achieve these elevated capacities and densities.

On small diameter pellets, 0.8 to 1.4 mm product diameter it is suggested to use a small single screw extruder or a twin screw design. Twin screw designs could reach up to 5,000 kg/hr of these small feeds. On feed pellets of 1.4 mm to the 3mm range, the capacities are basically 3 to 5 times what they used to be. Single and twin screw extruders can produce up to 7,500 to 10,000 kg/hr of shrimp feed products. An additional benefit is that feed producers who want to make both floating and sinking feed can use the new technology for both ranges. Capacities for small diameter floating feeds can also be increased to the 8 to 10,000 kg/hr range, 1.6 to 2.0 mm pellets up to 8 tonnes per hour and 2.1 to 5 mm pellets up to 10,000 kg/hr on a mid range extrusion cooker. Specialised dies and cutting devices are required to achieve these production rates.

Computer control systems

Control systems and dryer designs are also critical and an important consideration when making feeds of this nature at high capacities. Accurate introduction of the water, steam and other liquid flows into the conditioner and extruder barrel are paramount in achieving the feed desired with little or no problematic situations.

Have you ever tried to extrude through a 0.8mm die hole without proper water hydration of the ingredients? Making accurate feeds require accurate and controllable settings. This can be accomplished with manual control with digital assistance when making long continuous production quantities. Computer control options are a consideration when making exact feeds quickly and when producing many different formulations and or sizes in a production day. Computer controls do come with potential additional advantages such as storage of up to 10,000 recipes, running data and related formulation. Computer controls can record data for verification at a later date.

Sanitation issues of the feed can be addressed with regards to set temperature and time relationships assuming plant design can maintain the conditions post extrusion and drying. Energy efficiency programs for extrusion and drying allow for optimum production conditions based on current local atmospheric conditions. Extruders and dryers can communicate for accurate energy usage and final moisture contents. Small feeds do require special attention due to diameters produced. Horizontal dryers require a special screen product bed to insure the feed remains in position. When producing ultra small feeds it is suggested to use a fluid bed dryer.

Summary

The expansion of extrusion cooking with improved ingredient utilisation, advanced preconditioning and components for small diameter feed production at high capacities point towards an exciting future for extruded shrimp feeds. It will be interesting as the industry discovers and develops new ingredients. We have already seen and tested new soybean varieties genetically selected for advanced protein levels. The results showed the elevated protein levels processed as expected when producing feeds.

Additional work has shown extreme promise with regards to use of soybeans and advanced technology combining engineered liquid additives in the process to create a combination of ingredients to more closely match fish meal. The tests ended with feeding trials which showed that extrusion can be used to enhance final products when the extruder is used for multiple functions at the same time.

Equipment developments already exist to address many of the sanitation issues in the extrusion industry. Most of the emphasis is in the petfood industry and include the methods for flow control through the extruder based on temperature, self sanitizing pneumatic systems, horizontal sanitary dryer designs, improved vertical coolers, control system advancements and overall extruder barrel geometry.

We are looking forward to your challenges.

Joseph P. Kearns is Aquaculture Process Engineering Manager, Wenger Manufacturing, Inc. Sabetha, Kansas, USA. Email: JoeK@wenger.com

Improving nutrient digestibility in juvenile sex-reversed red tilapia

By Wutiporn Phromkunthong

A fermentation metabolite product offers possibilities to reduce feed cost in diets without compromising fish performance.

Dramatic increases in raw material prices used in freshwater fish formulations have occurred during the past several years, increasing feed and fish production costs and reducing feed miller and farmer margins. Several approaches have been applied to control cost increases, including: new plant cultivars with higher digestibility or higher content of critical nutrients, better processing and pretreatment of raw materials, and in-feed supplements such as organic acids and digestive enzymes.

This research explores the possibility of using a commercial fermentation metabolite product applied to feed mash prior to pelleting to improve plant-based ingredient digestibility, increasing opportunities to formulate less expensive diets while retaining desired production characteristics.

Two replicate studies were conducted to determine the effect of a commercial fermentation metabolite product (DV Aqua, USA) on nutrient digestibility of eight plant-based raw materials commonly used by the aqua feed industry in Southeast Asia. These were rice bran, soybean meal, canola meal, wheat bran, rice bran, copra, palm kernel cake, and corn. Results demonstrated significantly increased protein and energy digestibility for all eight raw materials in both replicate studies, and significantly increased dry matter digestibility for most of the raw materials in both replicate studies.

Trial design and methods

Fish were fed either a reference diet, 70% reference diet and 30% of the test raw material without DV Aqua, or 70% reference diet and 30% of the test raw material with DV Aqua. The composition of reference diet and 70% reference diet contribution to test diets are listed in Figure 1. All diets contained 0.5% chromic oxide marker. Apparent digestibility coefficients for the eight raw materials, with and without DV Aqua supplementation, were calculated as follows:

$$ADC_{diet} = 1 - [(\text{Nutrient in faeces/nutrient in diet}) \times Cr_2O_3 \text{ in diet}/ Cr_2O_3 \text{ in faeces})]$$

$$ADC_{ing} = [Nutr_{test} \times ADC_{test}) - (0.7Nutr_{ref} \times ADC_{ref})] / (0.3 \times Nutr_{ing})$$

$$Nutr_{tast} = 0.7Nutr_{ref} + 0.3Nutr_{ing}$$

where
ADC_{ing} = apparent digestibility coefficient of nutrient in ingredient
$Nutr_{ing}$ = nutrient concentration in test ingredient
ADC_{test} = apparent digestibility coefficient of nutrient in test diet
$Nutr_{test}$ = nutrient concentration in test diet
ADC_{ref} = apparent digestibility coefficient of nutrient in test diet
$Nutr_{ref}$ = nutrient concentration in reference diet

Floating (0.5mm) pellets were prepared using a single screw extruder at 120°C-125°C and stored at 4°C until feeding. Red tilapia juveniles weighing approximately 100g were cultured in 182 litres glass aquaria at 15 fish per aquaria, 4 replicates per treatment. Test feeding was conducted for 30 days prior to collection of faeces, and was continued for a second period of thirty days during which time all faeces were collected by siphon, pooled by aquaria, and frozen for later analysis. The data were presented as the means of two analyses. To test the effects of DV Aqua in each ingredient, data were analysed by two-way ANOVA. Where two-way ANOVA showed significant differences in means further analysis was made using the Duncan multiple range test.

Figure 1. Reference diet composition

Ingredients	% of formulation			
	Reference diet (RD)		Test diet (70% RD + 30% plant raw material)	
	Without supplement	With supplement	Without supplement	With supplement
Fish meal	10	10	7	7
Soybean meal	45	45	31.5	31.5
Rice flour	10	10	7	7
Rice bran	15	15	10.5	10.5
Fish oil : Soybean oil (1:1)	4	4	2.8	2.8
Vitamin premix	1	1	0.7	0.7
Mineral premix	3	3	2.1	2.1
Dicalcium phosphate	1.17	1.17	0.819	0.819
Choline chloride (60%)	0.1	0.1	0.07	0.07
Cassava	10.23	10.105	7.011	6.886
Chromic oxide	0.5	0.5	0.5	0.5
DV Aqua*	0	0.125	0	0.125
plant raw material	-	-	30	30
Total	100	100	100	100

* Diamond V Mills, Cedar Rapids, Iowa, USA. www.diamondv.com

Nutrient digestibility

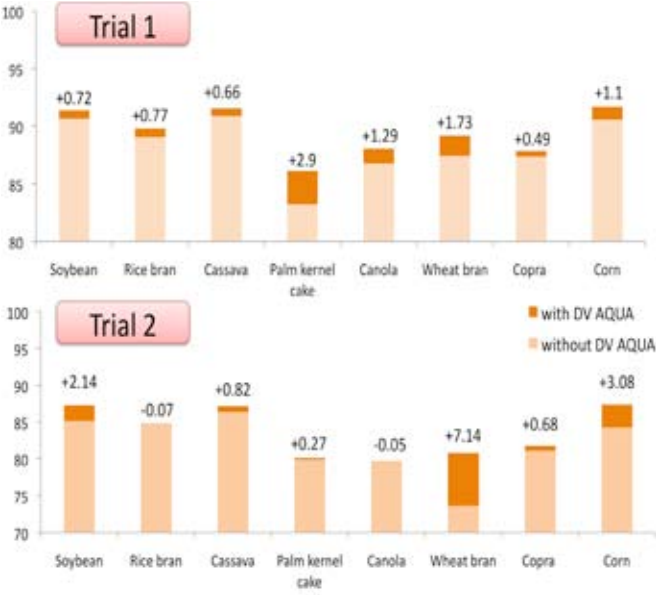
Apparent digestibility coefficients for protein and energy for all eight raw materials in both replicate trials significantly increased when the fermentation metabolite product DV Aqua was applied to feed mash at

Figure 2. Apparent digestibility coefficients (ADC) for protein of 8 raw materials with and without fermentation metabolite inclusion.

Figure 3. Apparent digestibility coefficients (ADC) for gross energy of 8 raw materials with and without fermentation metabolite inclusion

0.125% (Figures 2 and 3). Dry matter apparent digestibility coefficients increased significantly with DV Aqua application in both replicate trials for soybean, cassava, wheat bran, copra and corn (Figure 4). Rice bran, palm kernel cake, and canola showed significant dry matter digestibility improvement in one, but not in both trials.

Figure 4. Apparent digestibility coefficients (ADC) for dry matter of 8 raw materials with and without fermentation metabolite inclusion



Dr. Wutiporn Phromkunthong is associate professor and head of the Kidchakan Supamattaya Aquatic Animal Health Research Center at the Prince of Songkla University, Thailand. He received his Ph.D. in Biology from the University of Heidelberg, Federal Republic of Germany in 1995 and has been working as a lecturer at the PSU for more than 25 years. His research mainly focuses on aquatic animal nutrition. Email: wutipornp@yahoo.com

Conclusion

Significant protein and energy digestibility coefficient uplifts were conferred with the addition of DV Aqua to feed mash prior to pelleting. These results offer possibilities to reformulate less expensive diets without compromising fish performance and without having to install expensive spray applicators that are usually required for enzyme applications to aquafeeds. Several formulations using the uplifted values of the fermentation metabolite allowed for decreased use of fish meal, soybean meal, and/or vegetable oil in practical formulations to save up to USD20/tonne in feed ingredient costs.

Reformulated diets have not yet been tested in controlled growth studies, nor have essential amino acid ADG uplifts been determined. These two tasks are being planned.

Acknowledgements

Assistance for conducting this research was provided by Diamond V Mills, Cedar Rapids, Iowa USA. More information: Diamond V, Asia, Email: bhunter@diamondv.com

THE AQUACULTURE ROUNDTABLESERIES 2011

A shared vision for aquaculture in Asia

The Aquaculture Roundtable Series
17-18 August 2011

THE PERFECT PLATFORM FOR STAKEHOLDERS TO COME TOGETHER AND SHAPE THE FUTURE

While modern aquaculture has been around for the past 40 years, it has not developed at the speed expected of an industry that has the enormous responsibility of creating an alternative source of seafood to the dwindling capture fisheries. One of the major contributing factors is the lack of direction, coordination and technology development to propel the industry into the next level.

The Aquaculture Roundtable Series (TARS) aims to address this issue by providing a platform for the public, private sector, academia and NGOs to deliberate and identify a clear strategy to take the industry forward. TARS is a stakeholder driven effort to facilitate the sharing of information, reduce redundancy and improve efficiency.

The result should be a self initiative to direct the development in a guided manner, yet allowing for opportunities to 'think outside the box'. The benefit should come from the synergy of networking and creating efficiencies.

TARS is designed to take stock of the current situation and coordinate a concerted effort to move forward.

WHERE ARE WE TODAY?

Participants will benefit from updated overviews from leaders in their respective fields. This will form the starting point for the break-out sessions.

WHERE DO WE WANT TO BE TOMORROW?

Taking into consideration the current market situation, participants will get to brainstorm and propose new direction(s) to take the industry forward. It is likely that many groups will work on similar topics, giving a wider approach to related industry challenges. Participants will then regroup to report on the proposals resulting from break-out sessions.

Supported by:

AVA

Sponsors:

WENGER

EVONIK INDUSTRIES

Aquativ

Alltech
Nutrition, health, performance ...naturally

DSM

Organisers:

Aqua Research

corporatemedia
The Total Communications Company

AQUA CULTURE Asia Pacific

TARS 2011
AQUACULTURE FEEDS & NUTRITION

17-18 August 2011, Holiday Inn Atrium, Singapore

TARS is designed as a series of roundtable sessions to focus on specific sectors of the industry. The first sector identified for TARS 2011 is AQUACULTURE FEEDS & NUTRITION.

The aim of TARS 2011 is to provide a platform for all stakeholders to come together to share their knowledge and expertise in the different aspects pertaining to aqua nutrition, prioritise areas for R&D and formulate a new direction for the sector in light of current and emerging challenges facing the industry.

TARS 2011 targets the participation of nutritionists, feed formulators, aqua feed producers, integrators, feed equipment manufacturers, feed ingredients and feed additive suppliers.

REGISTRATION

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

Registration Fee: From 11 June 2011 – SGD 800

** Fee includes opening day cocktail reception, tea breaks, lunch and conference materials.*

More Information

Program and Speakers, click on: www.tarsaquaculture.com
Registration, click on: http://www.tarsaquaculture.com/registration.html
Email: conference@tarsaquaculture.com

LIMITED SEATS ONLY
REGISTER NOW!

PROGRAM

DAY 1 – WEDNESDAY, 17 AUGUST 2011

PLENARY SESSION: WHERE ARE WE TODAY?
International experts will present an overview of the state of the industry, including current knowledge on nutrition and feed technology, for the main species in Asia: marine shrimp, pangasius catfish, tilapia and marine fish (namely seabass, cobia and grouper).

0745 hrs – 0800 hrs
Registration

0830 hrs – 1030 hrs
Session 1: Back to Basics – Nutritional Requirements

- **What do marine fish need and what different feed ingredients contribute? Thinking beyond "fish meal and fish oil replacement" in aquaculture nutrition**
  Dominique Bureau, UG/OMNR Fish Nutrition Research Laboratory, University of Guelph, Canada
- **Feed requirement for shrimp at the grow-out phase**
  Wee Kok Leong, Temasek Polytechnic, Singapore
- **Balanced nutrition and feeding for health management**
  Jacques Gabaudan, Aquaculture Center Asia Pacific, DSM, Thailand

1030 hrs – 1100 hrs
Tea Break

1100 hrs – 1245 hrs
Session 2: Efficient Feed Processing

- **Current challenges in shrimp feed pelleting**
  Martin Guerin, Gold Coin, Malaysia
- **Extrusion cooking with increased capacities, higher sanitation levels and advanced computer control methods**
  Joseph P. Kearns, Wenger, USA

1245 hrs – 1400 hrs
Lunch

1400 hrs – 1600 hrs
Session 3: Learning from the Poultry and Salmon Model

- **Development of feed formulation technique and its potential application in aqua feeds**
  Mathew Clarke, Feed Management Systems, USA
- **Advances in protein nutrition: Bringing experiences in non-ruminant livestock species to aqua feeds**
  Robert L. Payne, Evonik Degussa, Singapore

1600 hrs – 1620 hrs
Tea Break

1620 hrs – 1820 hrs
Session 4: Balanced Formulations

- **Shrimp feeds and feeding; feed ingredient usage and development of improved on-farm feed and water management practices**
  Albert G.J Tacon, Aquatic Farms Ltd, USA
- **Fishmeal and fish oil in shrimp feeds: How close are we to complete replacement**
  A. Victor Suresh, Integrated Aquaculture International, Brunei
- **New complex enzymes can reduce fishmeal in marine fish diets**
  Serge Corneille, Alltech, Japan

1820 hrs – 1930 hrs
Cocktail Reception

DAY 2 – THURSDAY, 18 AUGUST 2011

0830 hrs – 1030 hrs
Session 5: Targeted Nutrition

- **Nutrition and health management in shrimp across culture systems**
  Craig Browdy, Novus Aqua, USA
- **Current status of freshwater aquafeeds**
  Pedro Encarnacao, Biomin, Singapore
- **Functional hydrolysates: A new generation of ingredients to improve the performance of aquafeed**
  Vincent Fournier, Aquativ, France

1030 hrs – 1050 hrs
Tea Break

1050 hrs – 1245 hrs
BREAK OUT SESSION:
WHERE WILL WE BE TOMORROW?

Participants will break into groups of 10 to discuss the challenges facing the sector or industry of their choice. (Participants will be required to select their sector or industry of choice in the registration form prior to the meeting and will be allocated to the groups) Led by a facilitator, there will be multiple groups discussing the three or more industry topics. The expected output would be a list of key challenges, priority areas for improvement and recommended strategies to take the industry forward.

The choice for industry groups are: Shrimp Feed, Marine Fish or Freshwater Fish and some of the proposed challenges are listed below:

Shrimp
- Differentiating between vannamei and monodon shrimp
- Least cost formulation
- Requirements for genetically improved strains

Marine Fish
- Moving from trash fish to compound feed
- Protein sparing and high energy feeds
- Feed texture and reducing waste

Freshwater Fish
- Least cost formulation
- Improving meat yield
- Feed texture and reducing wastage

1245 hrs – 1400 hrs
Lunch

1400 hrs – 1830 hrs
Report Session

A total of 6 facilitators, each representing 3-4 groups, will present a summary of the output from the breakout sessions. This will be an interactive session.

1830 hrs
End







AGRI INDO

The 3rd International Exhibition on
Agri Business and Technology

Food Dairy | Livestock Poultry | Fishery Aquaculture | Plantation Forestry | Chocolate Tea Coffee

29 SEPT - 02 OCT 2011

Jakarta International Expo - Kemayoran

FEATURING :

- Agri Food & Dairy
- Agri Livestock & Poultry
- Agri Fishery & Aquaculture
- Agri Plantation & Forestry
- Indonesia Chocolate, Coffee and Tea

The Leading
Agriculture & Industry
Exhibitionin Indonesia

ORGANIZED & SUPPORTED BY :

KRISTA EXHIBITION

Exhibition Organizer: KRISTA EXHIBITION
J. Ekasingsa No.29 Blk. , Jakarta 11220, Indonesia
Phone: +62 21 6345851, 6345852, 6304581, 6345002
Fax: +62 21 6304148, 6342113
Email : info@kristaexhibition.com
Website : www.kristaexhibition.com

KJBU

New technologies for superior **fish feed characteristics**

Combining two new process technologies to achieve full feed control

In aqua feed production, the task of extruding fish feed to create sinking or floating properties is primarily a matter of cooking the starch. In addition, it is the control of product density and thus the sinking and floating properties. Typically the degree of starch cook varies according to the amount of carbohydrates in the formula, where 80% or higher is typical with trout feed but only approximately 70% with shrimp feed. Furthermore, by making a specific screw configuration of the extruder, one can to a certain extent, supply the specific mechanical energy (SME) necessary to produce a given product with an optimum degree of cook. The degree of cook is decisive from both a nutritional as well as a physical product quality point of view. *The better starch cook, the better quality!*

In order to improve profitability of fish feed, the formula cost must be reduced to a minimum. By improving starch cook the level of carbohydrates can be reduced, thus including additional cheaper protein sources and contributing to lower costs.

The physical quality of fish feed product can be defined by:

- Density
- Shape and size
- Uniformity
- Durability
- Water stability

The nutritional quality of fish feed can be defined as:

- Recovery of essential amino acids and specific vitamins
- Digestibility

With the most technologically updated extruders, an optimum screw configuration can be established in order to apply the SME quantity necessary for matching a specific product, e.g. salmon or trout feed with a high content of fat/oil, internal oil or similar products with high nutritional value. A screw configuration can be optimised to apply more SME by implementing the following components:

- Screw design and geometry
- Shear locks
- Kneading blocks
- Reverse elements

An optimum screw configuration is not always capable of applying sufficient SME to produce a given product. Frequently it is also necessary to optimise other parameters, to increase the SME supply in the extruder:

- Screw speed
- Open area of venturi die
- Open area of die plate
- Extruder capacity

The task of producing fish feed primarily consists of combining an optimal product quality (optimum cook) with minimal production costs. Changes in screw configuration and other measures, which may contribute with higher or lower SME values, are all operations, which usually result in down time and increased production costs. Changeover procedures between 0.5 to 2 hours to adapt an extruder to a specific product are not unusual. Figure 1 shows the difference in SME typically generated in a high shear extruder configuration, compared with the SME range used when operating the FLEXTEX system for a high protein floating fish feed.

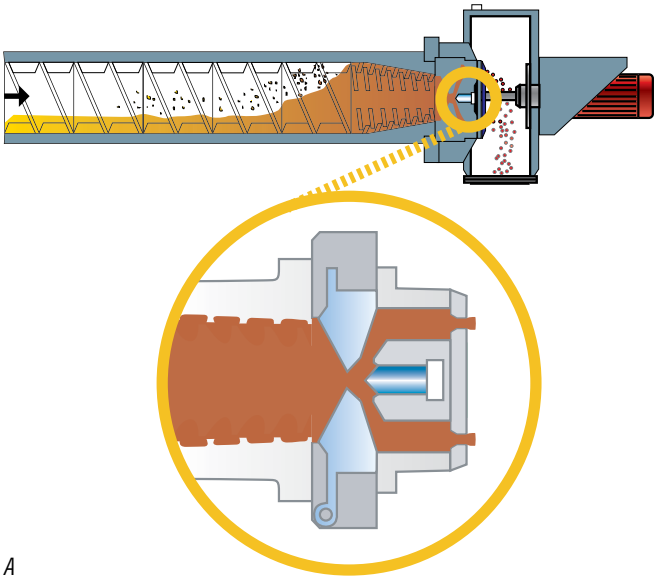
Figure 1.

Working principle

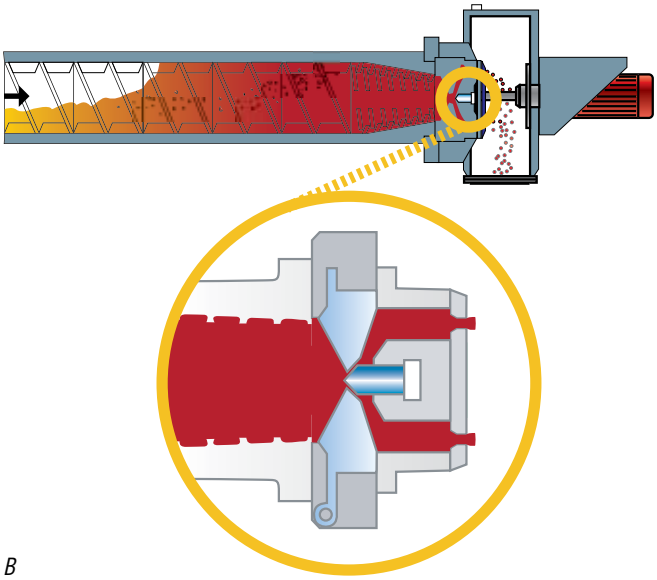
Technological advances, which focus on both cost savings in the form of reduced down time as well as optimal flexibility in terms of capacity and quality, have been in demand by the industry. With the development of the Flextex system (patent pending) the following advantages have been observed. There is no need to change extruder configuration regardless of SME requirement. There will be consistent capacity of extruder and the number of adjustment parameters during the extrusion process can be reduced. Basically, only the SME is changed (set-point) and there will be less impact by die plate design.

The Flextex system is based on being able to continuously control the SME applied in the extruder during operation without changing the extruder configuration or other parameters. The system adjusts the opening area in the venturi die plate, which is placed between the last screw and the die plate in the extruder. The venturi die is used in many extruders in a stationary design to decrease or increase the kneading

Figures 2 shows the Flextex in neutral position with no additional SME applied and Figure 3 in a closed position with additional SME applied.



A



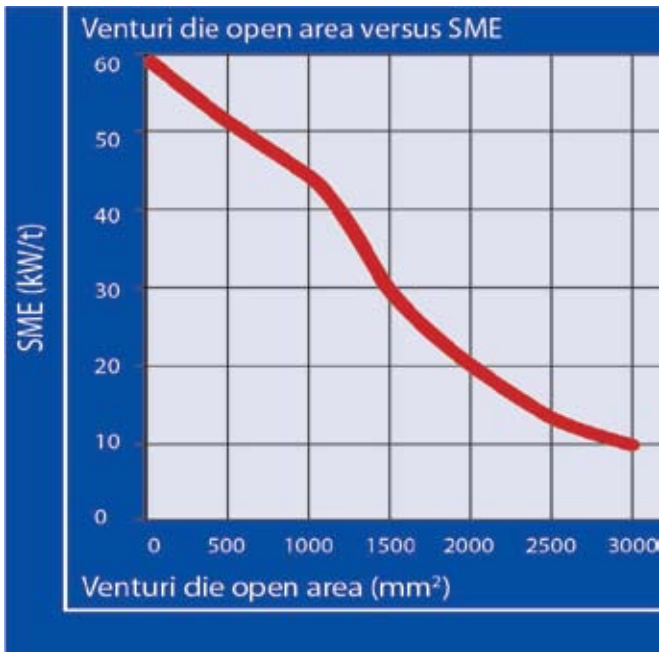
B

zone in the extruder in order to control the SME applied. This is done by adjusting the size of the hole and thus the opening area and the pressure against it. The smaller the hole, the larger the pressure and thus the more energy consumption from the main motor (Figures 2 and 3). With this system the opening area of the venturi die can typically be adjusted from 3000 mm^2 to 100 mm^2 (4.65 to 0.15 in^2) depending on throughput (Figure 4)

With the Flextex system the extruder operator can determine how much specific mechanical energy SME the product needs. From a control system, for example a separate control or alternatively a control integrated in the extruder control, the operator can make a set-point, e.g. kW/ton (HP/ton) dry matter. By means of a hydraulically controlled piston the Flextex system automatically adjusts in relation to the set-point by decreasing or increasing restriction of the venturi die by moving a piston.

This system, which in principle is a dynamic venturi die, controls and adjusts the SME supply continuously during operations. In short, the change of only this one parameter means the following for the production of fish feed;

Figure 4.



- The starch cook (up to 100%) is completely controlled during operation.
- The bulk density of the product can be reduced by up to 30% and can be controlled with an accuracy of ±5 g/l (0.3 lbs/ft^3).
- The higher addition of oil and less starch in the formula without significant influence to bulk density and product quality

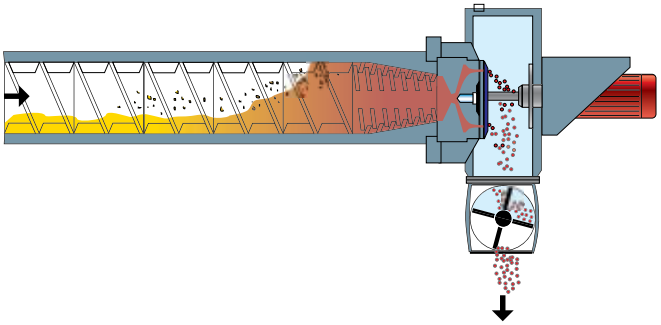
Increased bulk density with the Density Control System (ECS)

The system is the ideal tool to control starch cook and subsequently a reduction in bulk density. The increase in bulk density is controlled in the same way as in all conventional extruders. All parameters, which have a positive influence on increased bulk density, have a negative influence on starch cook, as increasing the bulk density in principle is a matter of reducing the SME and thus the starch cook.

To be able to control the bulk density of products in a wide range and at the same time obtain an optimum product quality, the Density Control System (ECS) is unique. The ECS concept (patented) is based on controlling the expansion in the extruder knife house without influencing the product quality. Thus all desirable parameters can be used in the extruder without regard to expansion. *The main focus is product quality.*

By adding compressed air in the knife house, one can control and adjust the pressure. This is made possible by mounting an airlock under the knife house (Figure 5). An increased pressure in the knife house results in a reduction of flash-off and thus an increase of bulk density (less expansion). The larger the overpressure, the larger the density, (less expansion).

Figure 5.



The combination

The Flextex and the ECS systems can either be installed individually or as a combined concept. This solely depends on each producer's requirements in the production. Frequently, a Flextex system is installed as a result of a requirement for either more starch cook, reduced formulation costs or increased capacity.

Performance tests

Documented tests supported by experience from systems in full scale operations have shown significant opportunities for the Flextex and ECS system. During a series of tests, a shrimp feed formula (70% protein) shown in Table 1 was used to conduct the following tests; effect on starch cook (Table 2), effect on bulk density (Table 3), effect on water stability (Table 4) and effect on reduced starch contents (Table 5).

Table 1. Test shrimp feed formula with 70% protein.

Ingredients	Before	After
Wheat	17.7	7.7
Wheat flour	4.4	2.0
Wheat gluten	5.6	5.6
Fishmeal (LT)	18.9	18.9
Soya (hi pro)	46.9	59.3
Shrimp meal	4.9	4.9
Oil	1.6	1.6

Table 2. Flextex effect on starch cook . By increasing the SME in the extrusion process by approx. 12% the cook rate was increased by 11.8%.

	w/Flextex			w/o Flextex		
Rpm %	Cook g/l	Bulk kw/t	SME %	Cook g/l	Bulk kw/t	SME %
215	100	565	28.0	93.4	590	20.5
290	100	525	33.5	91.7	580	25.0
360	100	540	37.5	88.2	515	31.0

Table 3. The ECS can increase the bulk density by 25% by adjusting the pressure in the knife house.

w/Flextex			w/o Flextex		
Density g/l	SME kW/t	ECS bar	Density g/l	SME kW/t	ECS bar
490	34.8	0	510	26.0	0
535	34.6	0.5	550	25.7	0.5
615	34.9	1.0	640	25.8	1.0
635	34.3	1.5	660	26.0	1.5
640	34.5	2.0	670	25.8	2.0

Table 4. Flextex effect on water stability. By increasing the SME it was possible to increase the water stability by an additional 6 hours.

w/Flextex	w/o Flextex
Water stability (hours)	*Water stability (hours)*
14	*8*

Table 5. Reduced starch contents in the formula with Flextex. By reducing the starch contents by approximately 50%, equal water stability (8 hours) could be obtained as with original high starch formula, but without Flextex (8 hours).

Ingredients	Before	After
Wheat	17.7	7.7
Wheat flour	4.4	2.0
Wheat gluten	5.6	5.6
Fishmeal (LT)	18.9	18.9
Soya (hi pro)	46.9	59.3
Shrimp meal	4.9	4.9
Oil	1.6	1.6

Summary

The Flextex and ECS system provides significant flexibility in the production of feed for all fish species. By continuously controlling the SME during operations, it is possible to achieve an optimal physical quality. At the same time, using the ECS to control the density, two unique tools for controlling finish product characteristics are present.

The advantages of the system are summarised as;

- Increase in starch cook by 10-15%,
- Decrease in bulk density by 20-30%,
- Increase in bulk density by 0-5%,
- No change of screw configuration (reduced down time)
- Only two parameters are needed to control starch cook, reduce and increase bulk density

The mechanical design of the FLEXTEX system

In principle this consists of 3 parts:

- The PLC control system
- The venturi die and the piston system
- The hydraulic station

Extruder with Flextex installed

Flextex open – venturi open

Flextex open – Venturi closed

The FLEXTEX system is designed with a focus on simplicity and comprises a few components only. The critical part of the system is however the piston, which besides being used as a restriction for the meal flow, also distributes the meal to the die plate. When restricting the meal flow it is essential that this take place synchronically in order not to hinder the flow ability. Changes in the meal flow will influence the visual quality of the product due to an uneven pressure at the die plate. The piston in the Flextex system is moved axially and at the same time it is conical, so that the meal flow is not negatively influenced.

Venturi 0% restricted (large open area)

Venturi 100% restricted (small open area)

Importance of effluent treatment systems for sustainable shrimp aquaculture in India

By Vikash Kumar, Debtanu Barman and Sagar C Mandal

The target is designing effective effluent treatment systems where shrimp farm waste water is expected to be as good in quality as that of intake water. This is sustainable farming without causing adverse impact to the environment and the ecosystem.

India has about 1.2 million ha of brackish water area and presently about 140,000 ha are used for shrimp farming in the coastal states and some Union Territories. A third of this area is presently under traditional methods of farming and the rest is under improved traditional and extensive methods of aquaculture.

Coastal aquaculture is diverse in terms of the resources used, the scale and nature of the practices adopted and the varied environmental characteristics. The main environmental concerns in the shrimp farming sector are the increased levels of nutrients including nitrogen and phosphorus and excess quantities of suspended solids and particulate organic matter in the waste water released from farms. While there has been considerable discussion on the impact of aquaculture waste water on the environment, there is however a paucity of time-series data to scientifically correlate the adverse impact of shrimp farm wastes on the ecology of open waters.

Waste water

In general, the nutrient levels and suspended solids in waste water of shrimp farms using improved traditional and extensive methods are within accepted norms. It is much less when compared with the waste water generated from the domestic sector and the fish processing units. However, waste water produced during the post-harvest cleaning operations of shrimp farms can have a much greater impact on the ecology of the open waters, although it may before a shorter period. Similarly, the impact can be significant where large numbers of shrimp farms are established in areas with poor flushing capacity.

In India, overcrowding of shrimp farms in certain areas and limited carrying capacity of the creeks/estuaries serving such farms has been a matter of concern (e.g. Kandeleru creek in Nellore District, Andhra Pradesh). Similarly, certain areas in Orissa state also have a concentration of shrimp farms. Presently, most of the farms lack effluent treatment system (ETS) for treating waste water before releasing into open waters. The farms which do have such a facility also do not conform to the scientific requirements. The integration of effluent treatment systems, based on best management practices in the shrimp farms will, therefore, assist the farmers to improve quality of waste water and make their farming practices more sustainable.

Existing legal provisions

Government regulations are important components of management in supporting aquaculture development, maintaining environmental quality, reducing negative environmental impacts, allocating natural resources between competing users and integration of aquaculture into coastal zone management. Presently, the following legal provisions are available to exercise appropriate control on discharge of waste water, generated by the shrimp farms and other developmental activities. The Ministry of Agriculture in its guidelines for sustainable development and management of brackish water aquaculture has prescribed standards for the waste water discharged from the shrimp farms. To achieve the waste water quality standard, proper treatment of farm effluents is a prime requisite will help the shrimp farms to achieve the objectives.

Effluent treatment system for shrimp farms

An effluent treatment system consisting of settlement pond (SP), bio-pond (BP) and aeration pond (AP) is proposed for shrimp farms practicing improved traditional and extensive methods of farming. By incorporation of the ETS facility, the farm waste water is expected to be as good in quality as that of intake water. Quality-wise, the treated waste water would also be suitable and ideal for recirculation within the farm, making the farming practice conform to the 'zero discharge' norms. However, such a recirculation system would need the establishment of a reservoir pond of suitable size.

A typical shrimp farm in India

Source of water is the dumping ground of waste discharge

Sampling for health status of shrimp

Illustration/Design: Capamara Design

Mediterranean Aquaculture 2020

October 18–21, 2011

Rodos Palace Luxury Convention Resort

Rhodes, Greece

www.easonline.org

aquaculture europe 11

Aquaculture Europe – the annual meeting of the European Aquaculture Society.

ETS design and layout

Basic considerations

The characteristic features of the shrimp farm waste water taken into consideration for designing the ETS are as follows:

i. The shrimp aquaculture waste water/discharge during culture period is high in volume, but relatively dilute in nature. When ponds are aerated adopting improved traditional and extensive methods of farming, discharges from the ponds usually contain adequate oxygen for aquatic life and diluted concentrations of nitrogen, phosphorous and organic matter.
ii. The shrimp pond water quality tends to deteriorate through the grow-out period, as feeding rate increases with shrimp size and biomass. Thus, the highest quantity and poorest quality of waste water, in terms of nutrient load, total ammonia and ionised ammonia and total suspended solid, are found just before harvest time, when shrimp biomass is at the maximum.
iii. Waste water discharge during harvest is usually the most important contributor to overall waste water loading, comprising over 75% of the total load.
iv. Stocking densities and management practices largely influence the quality of the discharge.

Construction of different types of ponds

Aquaculture Authority of India does not permit construction of shrimp farms in sandy soil as water from such farms will seep out. However, when an ETS facility is planned, soil permeability of the ETS site has to be checked and if percolation of water is suspected, either the site is abandoned or a clay lining should be provided to prevent seepage of effluent.

Settlement and sedimentation ponds

A settlement/ sedimentation pond is basically used to remove suspended solids from the wastewater flow. Shrimp farm suspended solid wastes during culture condition as opposed to harvest, are primarily composed of living plankton cells, feed material and other organic material, which do not easily settle down. A sedimentation tank can trap only 5 to 10% of such suspended solids. A retention time of one hour is sufficient to trap the material, which can settle down. Thus, the settlement pond is less effective in trapping the solid contents of the wastewater discharge during the course of culture.

However, settlement tanks are effective in trapping suspended solids during the harvest, when solid loads are far higher and particulate matter is denser. Studies have shown that 90% of the solids in the harvest discharge settle in sedimentation ponds. Thus, the sedimentation ponds prevent the release of most polluting organic matter that is discharged at the time of harvest to the environment. One pond of 90 m x 24 m x 1.2 m holding a volume of 2142 m^3 water is necessary for the system and earthen ponds will hold good. The pond should have at least five baffle walls to allow the wastewater to move slowly for a longer distance, enabling the settlement of solid waste material.

Bio-ponds or biological treatment ponds

Biological treatment aims at using plants and animals to reduce nutrient load and particulate matter in the shrimp farm discharge. Farm discharge after the treatment in settlement and bio-ponds can be used for recirculation to ponds for farming operation. Various options available for biological treatment of farm discharge are as follows:

- seaweed/water weeds to reduce the nitrogen and phosphorus level,
- molluscs to reduce suspended particulate matter, and
- fish to transform the phytoplankton into organic matter

Biological treatment can only be used to treat operational farm waste water i.e. during the culture period as the waste water during harvest time is biologically unsuitable in its direct form, unless diluted. However, the harvest waste water if allowed to remain in the settlement pond for a obligatory duration can be treated in the bio-pond. Two bio-ponds, each of 30m x 36m x 1.5m to hold a volume of 1620 m^3 water is necessary. The first pond is for stocking weeds and molluscs and the second for stocking fish.

Aeration pond

Aeration helps to increase the dissolved oxygen levels of water before it is pumped for recirculation. Besides, it also helps to oxidise any left over ammonia and organic matter in the water that comes out of the bio-pond. An aeration pond of 19 m x 36 m x 1.7 m for holding a volume of 1163 m^3 water is required. A minimum of two aerators of 3 HP each will be necessary to aerate the water.

Operation of effluent treatment system

It must be remembered that a smooth functioning of the modular ETS is dependent on the adoption of the proposed water exchange schedule successfully. As no water exchange is proposed during the first two months of culture operation, water required for necessary topping up should come from the reservoir. Similarly, water for the proposed exchange of 20% in 15 days during the third month of grow-out operation should also come from the reservoir. During the fourth month of culture, 20% water exchange in 10 days is proposed. For this purpose, water from the reservoir is preferable. If water stored in the reservoir is not sufficient, water from a natural source may be pumped into the reservoir, disinfected and used for water exchange. Such a water exchange schedule will avoid the spread of disease through the natural water source.

Conclusion

The present guidelines for adoption of effluent treatment system are general and suitable modifications may have to be made by farmers when adopting them. By introducing relatively simple mitigating measures such as wastewater treatment ponds or stabilisation ponds at the farm level by the individual farmer and by farmer associations or cluster groups, will help in the development of sustainable farming. It avoids causing adverse impact to the environment and the ecosystem.

Vikash Kumar

Debtanu Barman

Sagar C Mandal

Vikash Kumar is M.F.Sc student at the Central Institute of Fisheries Education, Versova, Mumbai-400061, India

Debtanu Barman is M.S. student at the Laboratory of Aquaculture & Artemia Reference Center, Ghent University, Belgium

Sagar C Mandal is assistant professor at the College of Fisheries, Central Agricultural University, Lembucherra, Tripura (W)-799210, India. Email: scmandal02@gmail.com

Asia's Largest Seafood Show

CHINA FISHERIES & SEAFOOD EXPO 2011

November 1-3, 2011
Qingdao, China

16th Annual Show

There's never been a better time to market your seafood to the world's largest - and fastest growing - seafood market.

Whether it's expensive seafood like abalone, lobster or crab, or lower value seafood like mackerel, squid or sardines, there's a market for your seafood in China. The best way to get your share of this lucrative market is to exhibit at China Fisheries & Seafood Expo. For the 15th straight year, China Fisheries & Seafood Expo, which was held in Dalian last November, set a record in the number of exhibitors and visitors. This year's show will feature almost 2,000 booths and 15,000 visitors from more than 80 countries.

Organized By:
Sea Fare Expositions, Inc.
2360 W. Commodore Way, Suite 210
Seattle, WA 98199
Tel: 206-789-5741 Fax: 206-789-0504
E-mail: seafoodchina@seafare.com

Sea Fare China Ltd.
16 F/A No. 58 Freetown Center
South Road Dongsanhuan
Beijing 100022 P.R. China
Tel: +86 10 58672620 Fax: +86 10 58672600
E-mail: info@seafarechina.com
www.seafarechina.com

www.chinaseafoodexpo.com

Developments and trends in tilapia in Asia

By Rafael D. Guerrero III

In 2010, world production of farmed tilapias reached 3.25 million tonnes exceeding the production of the salmon and catfish. (Fitzsimmons et al, 2011). Almost 74% of this production was in Asia. In 2010, China, produced1.15 million tonnes and together, Indonesia, the Philippines, Thailand, Taiwan, Vietnam, Malaysia contributed 38% to the global tilapia production.

The major tilapia species farmed in the region as a 'food fish for the masses' is the Nile tilapia (*Oreochromis niloticus*) for freshwater and slightly salty environments. The culture of Mozambique tilapia (*O. mossambicus*) and its hybrid with Nile tilapia in brackish water ponds and marine cages is now evident in the Philippines, Indonesia, Singapore, Taiwan and China.

The market for tilapia in the producing countries of the region is mainly for the domestic markets such as in the Philippines and Bangladesh. In the Philippines, where the fish is now considered the 'food of the masses' because of its availability and affordability, its high market demand makes it uncompetitive for export. China consumes more than half of its production (Fitzsimmons et al, 2011). The so-called red tilapia (*Oreochromis spp.* mutant and hybrid) has become an important 'cash crop' for local and export markets in Malaysia, Thailand and Taiwan. The US is the largest market for the tilapia with 190,334 tonnes of frozen fillets and fish in 2011 from Asian producers comprising 88% of total imports (Fitzsimmons et al, 2011).

Hatchery/nursery production

Appropriate hatchery/nursery systems for mass production of quality tilapia fry/fingerlings using artificial incubators, tanks, net enclosures (hapas), and earthen ponds have been developed in Taiwan, the Philippines and Thailand. Today, in the Philippines, hormonal sex reversal is widely practiced by private hatchery operators using methyltestosterone (MT) at 3 0-60 mg/kg of feed for 21 days in earthen ponds and hapas in ponds. It is estimated that over 50% of the more than 1 billion fingerlings of Nile tilapia produced in the country annually is sex-reversed. To some extent, commercial production of the GMT (genetically male tilapia) using YY supermales produced with hormone-feminized XY fish is done by a government hatchery.

Bhujel (2008) reported on the development of the hatchery/nursery technology for the Nile tilapia (Chitralada strain) by the Asian Institute of Technology in Thailand that has made tilapia the most widely cultured fish in the country. The technology consists of breeding the fish in outdoor earthen ponds with hapas, artificial incubation of eggs and sac fry indoors and hormone treatment of the fry for sex reversal with MT at 60 mg/kg of feed for 21 days using indoor tanks and/or outdoor hapas in ponds. Such technology has been adopted by 20 private hatcheries in Thailand and has spread to Bangladesh, Myanmar, Nepal and Vietnam.

The use of MT has been approved by the US-FDA as an Investigational New Animal Drug (Schnick, 2003; Fitzsimmons, 2007). The short duration of hormone treatment and the rapid metabolism and excretion of MT in the treated fish ensure consumers of a safe product (Phelps, 2006). However, the long-term effect of the metabolites of MT in the environment has yet to be fully evaluated but studies have indicated that MT easily breaks down in the environment when exposed to light and high temperatures (AHFS, 1977) and is metabolised by fungi and bacteria into carbon dioxide and water (Schubert et al., 1972; Jankov, 1977; Sandor and Mehdi, 1979).

Cages for saline tilapia hatchery and grow-out in Singapore

Genetic Improvement of the tilapia

The continuous expansion in production is attributed to the genetic improvement of the Nile tilapia which began in the Philippines in the 1980s with the GIFT (genetically improved farmed tilapia) and introduced to other countries in Asia. This led to the development of other improved strains such as the GET (genetically enhanced tilapia) of the Bureau of Fisheries and Aquatic Resources and the FAST (freshwater aquaculture strain of tilapia) of the Central Luzon State University in the Philippines. In China, a further bred GIFT with high growth rate (Zhao, 2011) is widely used as well as hybrid of O.aureus for its high male percentage. China now has other strains in production; Genomar Gift (*O. niloticus*), Baolu GIFT (*O. niloticus*), Ni ao (*O. niloticus* x *O. aureus*), Gili (*O. niloticus* x *S. melanotheron* F2), red tilapia (*O.niloticus* x *O. mossambicus*) and Mo he (*O. mossambicus* x *O. hornorum*).

With the potential of culture in brackishwater ponds in the Philippines, Indonesia and Vietnam, interest in the development of saline-tolerant tilapias has been increasing. Tilapia hybrids that have shown salt-tolerance up to 35 ppt such as the 'Molobicus' (*O. mossambicus* x *O. niloticus*) and the 'BEST" (*O. aureus* x *O. mossambicus* x *O. spirulus*) have been produced in the Philippines and are now grown by farmers in many areas of the country (Rosario et al. 2004; Tayamen et al. 2002).

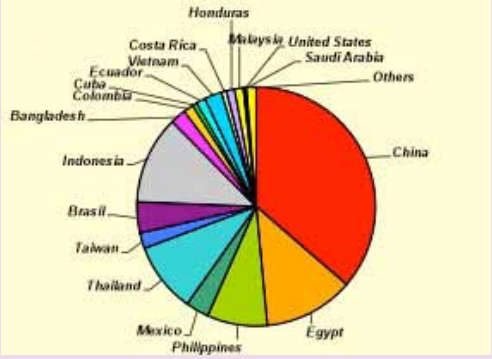
Grow-out production

Extensive to intensive culture of the fish in freshwater ponds is the most widely practiced culture system followed by intensive culture in cages/pens and tanks. Culture in brackishwater ponds and integrated crop-fish farming systems is also done in China, Vietnam . The Nile tilapia is the predominant species in most countries, farmed in freshwater ponds, cages/pens and integrated farming systems while the red tilapia is mainly grown in monoculture in tanks. The Nile tilapia and its hybrids with salt-tolerant species are produced in brackishwater ponds and cages.

At ISTA 2011

"The global adoption of tilapia as a substitute for all kinds of wild caught fish has driven demand higher every year, even through the global recession of recent years. The description of tilapia as a aquatic chicken becomes more accurate every day" *– Kevin Fitzsimmons, Martinez-Garcia, R and Gonzalez –Alanis, P. on 'why tilapia is becoming the most important food fish'*

World tilapia production in 2010



Estimate of tilapia production in Asia in 2010 (tonnes)

China	1,150,000
Philippines	258,663
Thailand	300,000
Taiwan	67,000
Indonesia	400,000
Bangladesh	100,000
Vietnam	75,000
Malaysia	44,000
Total Asia	2,394,663

In the brackishwater ponds of Pampanga in the Philippines, the semi-intensive poly-culture of milkfish (*Chanos chanos*), white shrimp (*Penaeus vannamei*) and Nile tilapia is practiced. The use of sex-reversed tilapia hybrid (*O. mossambicus* x *O. niloticus*) for maintaining 'green water' in the intensive brackishwater culture of the black tiger shrimp (*Penaeus monodon*) for mitigating the luminous bacteria disease is still done (Corre, pers. comm.).

There is continued growth in the production of farmed tilapia in the region. In the Philippines where tilapia contributes 97% to the total freshwater aquaculture production, there was a 56% increase in production from 145,868 tonnes in 2004 to 260,911 tonnes in 2009 (BFAR, 2010).

In Thailand where the Nile tilapia contributes 35% to the total freshwater fish production from aquaculture, tilapia is the "poor man's fish" because of it can easily be cultured and has a relatively low market price (Samprongpam et al., 2008). In Indonesia, tilapia is also a priority species for culture in freshwater ponds and cages, and brackish- water ponds in Indonesia which produced 110,225 tonnes of the fish in 2009 including exports of fillets to the United States. Monosex fry production with the GMT technology is practised (Sugama, pers. comm.). In Malaysia, the red tilapia is 90% of the total farmed tilapia produced.

India, is now open for the culture of tilapia that was previously banned. Imported tilapia stocks are now allowed into the country provided that controls are in place to prevent the exotic species from escaping into open waters and that their distribution in the country is regulated. This change in policy came about after local trials showed that the tilapia grows better and is more economical to culture than the indigenous species (Rao, pers. comm.).

With intensification of culture, poor management and changing climatic conditions, bacterial disease outbreaks during extreme hot and cool periods have occurred in many countries of the region causing massive tilapia mortalities. In Thailand and Indonesia, streptococcal disease (*Streptococcus agalactiae*) of Nile tilapia has been reported (Sugama, pers. comm.) and the same bacteria was isolated in Hainan and Guangdong provinces of China (Zhao, 2011). A vaccine for *Aeromonas hydrophila*), a common tilapia pathogen, has been developed in the Philippines (Yambot, pers. comm.). The prevalence of global climate change appears to be taking its toll on tilapia aquaculture in the region. Massive fish mortalities in cages have been reported due to a cold spell and El Nino in Taiwan and the Philippines, respectively.

Trends

Two major trends in the production of tilapia in the region are evident. These are the improvement in product quality through GMP (good management practices), HACCP (hazard analysis critical control points), traceability in many countries and the production of organic or 'green' tilapia in Thailand and Vietnam particularly for the European market. With the concern for food safety, many fish feed manufacturers and processors in the region have become ISO 9100 and ISO 22000 certified. In recent years, farm certification to GlobalGap, Aquaculture Certification Council and Aquaculture Stewardship Council of the WWF initiated Aquaculture dialogues are gaining momentum.

Taiwan Tilapia Alliance is marketing the technological advances the country has made in the industry and is exporting this to several countries. Among them is the traceability system. In marketing they are promoting branding and production of valued added products, gelatine and collagen (Chiang, 2011)

Conclusion

There is a continuing growth in the production of tilapia brought about mainly by genetic improvement, especially the production in China. The keen concern of tilapia farmers in the region is product quality and safety, and the production of organic or 'green' tilapia in some countries are emerging trends. There is also need to address bacterial disease outbreaks and impacts of climate change on tilapia farms for sustainability.

Selected references

Fu-Sung Frank Chiang, Peter Chiang, Fen-Lan Chen, Kelvin Chen and Mao Sheng Liu, 2010. Taiwan's technological and marketing experience of tilapia and its production. Presented at Tilapia 2010 Kuala Lumpur, Malaysia, October 27-29, 2010

Zhao Jinliang, 2011. Tilapia germplasm in China: chance and challenge, in Kevin Fitzsimmons and Liu Liping, eds, 2011. Proceedings of the 9th International Symposium on Tilapia in Aquaculture, Shanghai, China, pp217-221.

Kevin Fitzsimmons, Martinez-Garcia, R and Gonzalez –Alanis, P. 2011. Why tilapia is becoming the most important food fish in Kevin Fitzsimmons and Liu Liping, eds, 2011. Proceedings of the 9th International Symposium on Tilapia in Aquaculture, Shanghai, China, pp8-16.

Rafael D. Guerrero III, Ph.D. is with Aquatic Biosystems, Laguna, Philippines 4033.
Email: aquabios@yahoo.com

Tilapia is gaining popularity in Vietnam

In the last five years, tilapia production has gained momentum and is poised to be the third export commodity from Vietnam.

Tilapia will soon emerge as the third key species for export, after the marine shrimp and *Pangasius hypophthalmus*. Currently, the production is mainly for the domestic markets in major cities- mainly Ho Chi Minh City, Cantho City and Hanoi in the north. A small volume of 480 tonnes was exported, mainly to the EU and US in 2008 valued at USD 1.26 million. However, to compete in the EU market, producers will be required to farm fish of one kg size rather than the current 700 g or smaller fish.

Tilapia is farmed mostly in cages in the Mekong (Cuu Long) Delta (Tien Giang, An Giang) and some provinces in the Red River Delta (Hai Duong, Hung Yen). Tilapia juveniles are procured from two sources: locally produced in the southern provinces or imported from China, Taiwan and Thailand. It is estimated that around 2 billion juveniles and 385 million male unisex tilapia are needed for production. Some 43 hatcheries in the north have the capacity to produce male unisex tilapia juveniles, meeting only 28% of the market demand. 15% of the demand are met by imported seed stock and the rest are provided by hatcheries in the southern region. Quality seed stock is a constraint.

In My Tho in the Mekong Delta, tilapia is cultured mainly in cages previously used for the culture of the pangasius catfish. Nguyen Van Hoi started tilapia farming in cages 6 years ago. In his farm, there are 36 cages of 5m x 8m x 3m deep, each holding 30,000 red tilapia (*Oreochromis sp*). In two other farms managed by his two sons-in-law, black (*Oreochromis niloticus*) and red tilapia are cultured in 20 cages. The fry for his cages come from local hatcheries. Fry cost VND 26,000/kg containing 15-16 of mixed sex fish. These are kept in the nursery until 20g size. This allows Nguyen to monitor the health status of the fingerlings before transferring to the grow-out cages.

The preferred market size is usually one kg but in June when demand is high, fish of 700g size are also marketed. The grow-out to 700g takes 7 months. Ex-farm prices are around VND 35,000 to 40,000/kg (USD 1.95/kg). Fish is usually collected by brokers for the local live fish markets. In a local restaurant in My Tho, the menu price is VND 90,000/kg (USD 4.39/kg).

Each cage produces 10-12 tonnes of 700g fish. The cost of production is VND 27,000/kg (USD 1.31/kg) of which feed account for VND 24,000/kg and the FCR is 2:1 for a 700g fish. Nguyen has the advantage of the Uni President Vietnam feed mill sited across the river in My Tho. If he were to purchase feed elsewhere, the transport cost would be an additional VND 50,000 for each 25kg bag. Throughout the culture, four feed sizes are used and the feed composition of the median size extruded pellets (3 to 3.2mm) is 30% crude protein and 5.0% fat.

Although Nguyen is well known as a role model in the area and is successful in tilapia farming with the best survival rate and fastest growth rate he says there is nothing special with his method and most farmers will be able to do the same.

Information from MARD on tilapia in Vietnam was provided by Le Thi Ngoc Diep

Shopping Asian at ESE 2011

A selection of Asian producers targeting the European market with sustainable shrimp and fish

Tho Ching Ching, assistant general manager (right) and Rohana Ahmad Ramli, assistant QC manager represented Goh Siong Tee Marine Product Sdn. Bhd (GST) at the Lee Fish booth

FOS snappers, groupers, barramundi from Malaysia at the Lee Fish booth

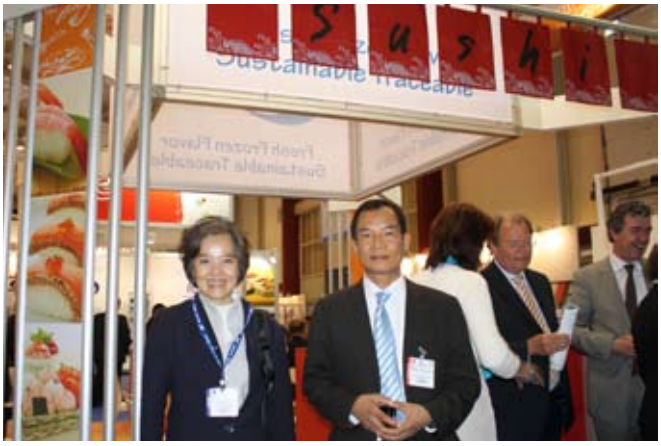
This 19th annual European Seafood Exposition (ESE) is the largest seafood event in the world. It has overtaken the Boston Seafood Expo, the main seafood expo in the America, and draws some 25,000 visitors annually. The 2011 show occupied 6 halls of the Parc des expositions in Brussels. Initially, the European show was held to complement the American equivalent but now it also draws seafood producers and traders from Asia and beyond. Whilst Vietnam and China are regulars, this year, the new additions are Philippines and Africa, said organisers Diversified Business Communications. In 2010, interest in aquaculture was shown by 22% of visitors.

Lee Fish markets products from Malaysia and Indonesia, amongst other aquaculture and wild caught fish from New Zealand (various fish and Leigh lobsters), Philippines (yellow fin tuna) as well as Sustainable Fisheries Partnership (SPF) certified Yellowfin tuna. It also markets barramundi produced by Fega Mariculture, Indonesia (Aqua Culture Asia Pacific, Volume 6 (6), November/December 2010, p29-31). Friends of the Sea certified farmed fish is produced by **Goh Siong Tee Marine Product Sdn. Bhd (GST)** group based in Penang, **Malaysia**. The products are raw fillets of farmed barramundi, red snapper, grouper and pompano produced from its cage culture operations. Products are exported as well as supplied to outlets and hotels in Malaysia. Fish farming is in cages off Penang Island whilst the brood stock cages are located further south off Pangkor Island.

China's Tongwei Hainan Aquatics Products (TWAP) is part of the large privately owned Tongwei group with businesses in the food and feed sectors as well as in IT, architecture etc. TWAP is vertically integrated with facilities throughout Hainan Island for the production of tilapia, golden pompano, cobia and marine shrimp. It has six hatcheries on the island producing 300 million fish fry and 3 billion shrimp post larvae. For the tilapia it has three types of fish; saline, pond and reservoir reared. The products are shallow, semi deep and super deep skinned and breaded. The golden pompano, farmed in net cages is processed as butterfly fillet and cobia farmed in offshore net cages is marketed as steaks and chunks. Seabass *Lateolabrax sp* is also farmed. The types of shrimp products vary from cooked headon shell on (CHOSO), raw butterfly to cooked and breaded shrimp. The full capacity of the processing operations is 30,000 tonnes annually.

Shenzhen SEM listed **Zhangjiang Guolian Aquatics Products** is based in southern China. The company is a fully integrated producer with hatcheries, feed production, farming and processing of shrimp and tilapia. The shrimp grow-out farm and shrimp hatchery in Nansan, Guangdong, tilapia grow out in Wuchan District and seafood processing facilities in Zhanjiang are all Aquaculture Certification Council (ACC) certified. It credits itself as the only company excluded from FDA's import alert for shrimp in 2007, zero antidumping tariffs and only supplier of live shrimp to the Hong Kong market.

India's Shree Datt Aquaculture Farms has named its shrimp product Tandel's, after the fishing community in Gujarat, where the company started in 1994. It is now a major seafood producer and exporter. The farming area has expanded to 220ha and it set up a processing plant in 2006 and a hatchery for black tiger shrimp in 2009. Environmentally friendly farming of black tiger shrimp provides two crops/year of average yields of 3-4 tonnes/ha. Shrimp are stocked at only 6 post larvae/m^2. CEO Rohan Tandel is targeting 70% of production to the EU market. Currently it is already exporting to European food service companies. The main sizes of the shrimp are 20/30 and 10/20 of raw and cooked shrimp. Products are peeled deveined tail on/off, head on shell on, headless easy peel. Tandel said that although



Thawil Nandatheero, Thai Union (right) and Dusadee Chancharoen, Thai-MC.

CEO Rohan Tandel (middle) and his team

Lee Fish Europe AG president Daniel Christen (right)

vannamei shrimp farming is more profitable, they would nevertheless continue with black tiger to be assured of its availability. The promise to customers is also the conservation of the environment and to the community, to make a difference by touching lives through education, employment opportunities.

Some 14 years ago, M.Gupta created an aquaculture farm, which today is one of few integrated seafood companies in India, comprising a hatchery in Kotada, grow out farms in Navsari, Bharuch and Surat and processing in Surat. The brand produced by the **West Coast group** is Cambay Tiger, named after the Gulf of Cambay, off the west coast of Gujarat and Maharashtra. Grow-out in semi-intensive conditions of 10 post larvae/m^2 in 350 acres of ponds produce 1,000 tonnes/year and a satellite farm produces 1,200 tonnes/year. The products are black tiger and vannamei shrimp, head-on, headless, peeled and deveined tail on/off (PDTO/PD) and ezee peel etc. The philanthropic activity is the Shivsmaran Charitable trust with programs in health, education and employment. Both companies were part of the 15-booth Indian pavilion under the umbrella of MPEDA- Marine Products Export Development Authority of India.

Indonesia's shrimp farming industry is still in the recovery phase following a disease crisis in 2009. On the positive side, ESE is a place to keep in touch with old customers as well as develop new ones at the Indonesia pavilion. Seafood exporters were led by Johan Suryadarma, Indonesian Fishery Product Processing and Marketing Association and DG of Fisheries Products Processing and Marketing, Ministry of Marine affairs and Fisheries. **Multi Monodon** group started with a processing plant in Makassar in 1970 and since then it has expanded into the traditional farming of the black tiger shrimp in 2010. It has a European bio label and it processes 1,500 tonnes of organic shrimp. In 2011, this production will be expanded to Java Island.

The world's largest fully vertically integrated shrimp operation, **Central Proteinaprima (CP Prima)** continues to leverage its position as a leading shrimp producer and major exporter of shrimp from Indonesia. Recent production has been much lower than annual target but the company assures that their innovative management and stringent biosecurity measures will enable them to better mitigate risks of diseases. CP Prima, a leader in brood stock production (through Shrimp Improvement Systems), fish and shrimp feed (40% of market in Indonesia) reaffirms its commitment to its plasma farmers and sustainability and traceability in the production chain. The three star ACC and Global Gap certified producer also has a green belt restoration project with a target of replanting of 5,200 ha of mangroves by 2011. A recent addition is the production of saline red tilapia and exports are whole round, skin-on fillet and skinless fillet. The company started to farm tilapia after the shrimp disease debacle. Large fish are produced for the export market.

The production at the **Agrobest Farm** in **Malaysia** was promoted at the booth of the Maruha Nichiro group, Japan's leading seafood conglomerate formed in 2007 with the merger of two Japanese companies. The seafood business includes fishing, aquaculture, importing, exporting and processing. In aquaculture, the company leads with tuna farming in several locations in Japan where it is working towards full cycle farming. Agrobest is the company's shrimp farm in Malaysia, producing both vannamei and black tiger shrimp. The 1,300ha farm, the largest in Malaysia, was acquired in 2008. Since then the production has been increasing from 5,000 in 2008 and 7,500 tonnes in 2009. The target is to reach 10,000 tonnes in 2011. The company also has grouper farming activities in the Philippines.

Malaysia's second largest integrated shrimp farm **Blue Archipelago** (BAB) was incorporated in 2007 and has achieved 2,000 tonnes of vannamei shrimp production from its 400ha farm in 2010. It is targeting 3,000 tonnes in 2011. The CEO, Abu Bakar Ibrahim together with his marketing team was at the Malaysia Pavilion to promote exports into the European head on shell on (HOSO) shrimp market. It currently exports headless shell on to Japan and the US. Abu Bakar said the processing plant is within the farm perimeter, which gives BAB the advantage of moving its shrimp from harvest to processing in under one hour. The expansion plans include the new 1,000 ha farm in Terengganu on the east coast of West Malaysia. The first phase will be operational in 2012.

Vietnam

Similar to other years, Vietnam has the largest contingent with 50 booths. This was also the 14th time for most of the Vietnamese businesses. According to Nguyen Huu Dung, Permanent Vice President of the Vietnam Association of Seafood Exporters and Processors (VASEP), on the first day of the expo, Vietnam's tra fish was sold at 3.45-3.6 Euro/kg, much higher than the floor price, with some enterprises signing contracts with foreign partners. At the 11th Seafood Prix d'Elite, Vinh Hoan Corporation took the top award for best new retail product with its entry, Provocake. On the other hand, Vietnam's catfish continued to receive negative publicity questioning its environmental sustainability. A seminar 'reconciling production boom with sustainability' was held to provide more information on Vietnamese tra fish products and production (see the report in Aqua Culture Asia Pacific, May/June 2011, pp4-5).

The next European seafood exposition (ESE 2012) will be from 24-26 April 2012 in Brussels, Belgium.

New version 4 and industry updates at ESE

It is a tradition for GLOBALG.A.P. to have a press conference at the yearly European Seafood Exposition (ESE) in Brussels. This year, on May 4, chairman, Nigel Garbutt presented the New Version 4 which responds to consumer requirements. He also announced several developments in Asia and South America.

The aquaculture scope began with the standards for salmonids in 2004, followed by shrimp, tilapia and finally pangasius. Garbutt said, "One of our thoughts was to integrate our standards to the increasing list of aquaculture species to certify. After a 4-year intensive revision work, we now have standards for any aquaculture operation worldwide to demonstrate good aquaculture practices across major categories, e.g. any finfish, crustacean or mollusc farming activity. The standards is highly integrated and avoids conflicts in different areas. The requirements are easier for producers to understand and meet."

Aquaculture Version 4 is a product of public consultations with more than 500 comments received from stakeholders representing 116 organizations worldwide. From harvesting it goes through the chain custody into processing and gives the opportunity to have the GLOBALG.A.P. number. This is important to reassure customers and show integrity. Food safety, is a main priority with 65 control points. Traceability is another important component covering all stages from broodstock, seedlings, grow-out farm and post harvest handling operations. Compound feed supplied to aquaculture farms is included on the scope coverage and auditing activities. The specifics of these are detailed on the website http://www.globalgap.org/cms/front_content.php?idcat=9&idart=2136

"In this version, there is the voluntary add-on social practice module, GLOBALG.A.P. Risk Assessment on Social Practice (GRASP) for those farms wishing to demonstrate risked based assessment on social practices at farm level. This does not form part of the certification but allows producers to develop competence."

"The all farm assurance takes a holistic approach. Looking from the point of view of consumers who expect minimum standards, this gives a good and solid basis for the producers to aim towards responsible production."

Equivalence to national standards

The equivalence mechanism is also important for the company which is working to recognise national standards. This helps to drive national convergence in stardards and reduce duplication. To date, the SalmonG.A.P, the private salmon scheme of Chile, is now benchmarked with GLOBALG.A.P. This is key to driving local adaptation, local standards for efficiency and harmonisation in more responsible production in aquaculture.

Developments

This year, panel members included Arni Mathiesen, FAO assistant director responsible for fisheries and aquaculture, Peter Neidermeier, Binca Seafoods Germany, Anne Laurence Huillery, Regal Springs, Magreet van Harn, Heiploeg, Netherlands, Dr Marc Nolting, GIZ and Trgve Lea Berg, product manager with the feed producer Skretting in Norway and currently running a technical working group in Norway. Also on the panel were Janic Bertini Anieri, Mar&Terra and Marcelo Corsi Eiger, Nativ Pescados. These two Brazilian producers of tropical and native species are moving towards certification.

Anne Laurence Huillery (right) is sustainability manager at Regal Springs and Magreet van Harn is marketing director at Heiploeg Group, BV.

From left, Yanic Bertini Anieri, expert and marketing manager, Marilia Rezende and Jorge Souza, CEO, Mar&Terra with Marcelo Corsi Eiger, Nativ Pescados. The certification will give confidence to their consumers for Brazil's native species.

Vietnam

A year ago, the German Agency for International Development Service (GIZ), local farmers in Vietnam and several global partners including the Dutch Sustainable Trade Initiative (IDH), started the two year project for sustainable pangasius supply chain involving GLOBALG.A.P. As 30% of catfish is exported to Europe, there a responsibility for sustainable production. Nolting, who coordinates responsible fisheries and aquaculture said that farmers in Vietnam have been preparing for WWF Aquaculture Dialogues and GLOBALG.A.P. standards for pangasius for some time. "To date, three large scale farms are certified for a quarter of their production of 4-5,000 tonnes. The target is 10,000 tonnes of production per year to be certified GLOBALG.A.P. and Aquaculture Stewardship Council (ASC). ASC compliance is the last step in the 4-phase project. We will continue to provide technical and financial assistance to get small scale farms certified."

In the production chain, feeds have a huge impact, not only on quality but also on the environment. In 2009, Niedermeier reported that Binca Seafoods, Germany took the draft of the compound feed manufacturer standards for self assessment with the pangasius feed producer Viet Thang. It used ISO22000 standard as the basic to work out the need for certification. When this was obtained, a trial audit was carried out in April. Between the two standards, the gaps are in getting raw material suppliers for analysis and to show traceability of fish meal before full compliance of all ingredients.

Joint audits

This is a cooperation between GLOBALG.A.P. and WWF and is specific to the first Aquaculture Dialogue Standard on tilapia (International Standard for Responsible Tilapia Aquaculture (ISRTA). Regal Springs, as producer and exporter of tilapia carried out the first joint audit. Conformance against ISRTA now issued on farms in Honduras and Indonesia with farms in Ecuador on the way to receiving it. Huillery said, "The benefits were savings with time and costs with a single training as Regal Springs did not need to organise two sets of training and audits. As a producer, this is important. The two sets of standards are complimentary, GLOBALG.A.P. on food safety etc and ISRTA is more focussed on environment and social aspects. There are no conflicts between the two standards. This helped as some ASC complaint farms did not need to wait for it to be ready."

National Young Scientist Aqua Conference 2011

In July, 140 students and young lecturers in aquaculture from eight universities and three research institutes in Vietnam gathered for a scientific conference in Nha Trang University. This yearly event encourages the sharing of research results, experiences, new ideas and opportunities among participants.

The aim was also to provide a venue for networking among universities and research institutes, said Dr Pham Quoc Hung, head of Fisheries Biology Department, Nha Trang University in his welcome address. The participating universities included Nha Trang, Can Tho, Nong Lam, Hue, An Giang, Vinh and the International University HCMC. The research institutes for Aquaculture (RIA) were RIA1 (Northern and North Central Vietnam), RIA2 (South Vietnam) and RIA3 (Central Vietnam). The conference was exclusively sponsored by Uni-President, Vietnam.

Dr Do Van Ninh, vice director of Nha Trang University told the audience that in recent years, Vietnam has witnessed a strong growth of aquaculture. In 2010, aquaculture accounted for 60% of the total fish production in the country.

"The achievements in the development of aquaculture is a result of the efforts of farmers all over the country. However, there is a large contribution on fishery and aquaculture research from universities and scientific research institutes in the country. We also have help from international organisations, research institutes, universities and international scientists. Currently, aquaculture has been growing in popularity in our country but it also has adversely impacted the environment and diseases in aquaculture are increasing. It is the role of research students and young lecturers in Aquaculture 2011 to study, research and propose solutions for sustainable development."

From left: Dr. Nguyen Quang Linh, Hue University; Dr. Pham Quoc Hung, Nha Trang University; Ma Chin Tien, Uni-President Vietnam; Dr. Lai Van Hung, Nha Trang University; Le Thanh Hung, Nam Long University.; Wu, Ming-Hsun, Uni-President Vietnam; Dr. Ngo Anh Tuan, Nha Trang Univ. and Dr.Hoang Tung, International University HCMC.

"We are enjoying the significant growth in aquaculture industry. Ten years ago, aquaculture production in Vietnam was 300,000 tonnes but this has sharply increased to a 2.8 million tonnes industry in 2010. However, the knowledge and experience that we have may not be enough and is not all contained in textbooks. I am excited to learn that more young scientists are involved in innovative research and trying to find new solutions for aquaculture in our country, region and globally. We also need to thank the dedicated professors who have created the interest among students in aquaculture and are guiding them in research in aquaculture issues," said Wu, Ming-Hsun, assistant vice president, Uni-President Vietnam.

In his keynote address, Dr Pham Anh Tuan, Ministry of Agriculture and Rural Development (MARD) outlined the role of aquaculture in Vietnam. "The area and production of aquaculture have increased in the past ten years. The objective of fisheries in Vietnam from 2010 to 2020 is to reach a total production of 7 million tonnes, valued at USD 5.5 billion and to employ 2.5 million people in aquaculture. Our challenges are in marketing, use of water and land resources, aquaculture infrastructure and to achieve these objectives, we will need solutions for high feed costs, disease problems and environmental degradation. We need to look at fishmeal usage, as consumers are interested in sustainable aquaculture."

Among the presentations was one on cage aquaculture of marine species in south and central Vietnam by Dr Le Minh Hoang from the Faculty of Aquaculture, Nha Trang University. The findings showed the culture models for some common species in Vietnam such as barramundi, red snapper, pompano, cobia and lobster. The presentation gave details such as stocking density, feeds and feed management, cage and water management. In feeds, artificial pellets such as Uni-President's marine fish feed are used to culture sea bass, red snapper and pompano with FCR of 1.4-1.5 (sea bass) whilst those from Ewos are used to feed the cobia.

The next conference will be held at Hue University of Agriculture and Forestry in May 2012.

ASC reaches major milestones

The Aquaculture Stewardship Council (ASC) has announced that Bas Geerts of UTZ Certified will be the new Director of Standards for the Aquaculture Stewardship Council (ASC), the independent entity responsible for managing the global standards developed by the Aquaculture Dialogues. This marks the end of the development phase of the ASC, overseen by Dr. Philip Smith, and the beginning of the operational phase.

The ASC also announced today that the groups that managed the Dialogue roundtables will hand over the first four sets of standards developed by the Aquaculture Dialogues, a series of multi-stakeholder roundtables coordinated by WWF, to the ASC. The standards are for farmed tilapia, pangasius, abalone and bivalves (clams, oysters, mussels and scallops). The ASC's Supervisory Board is in the midst of selecting a CEO for the organisation. In the meantime, Dr. Esther Luiten, former co-director of the North Sea Foundation and the current program manager for aquaculture at IDH, will act as managing director of the ASC. In this interim period, Luiten has stepped down from her post at IDH, which helps fund the ASC. She is working now together with Geerts to gear up the ASC under the supervision of the ASC Supervisory Board. More information: www.ascworldwide.org

The handover at the ESE2011 on May 3.

Cargill conducts farmer training in Indonesia

Cargill Indonesia recently conducted a series of farmer training seminars covering eight locations in Java, Sumatera and Kalimantan. The seminars, which dealt with water quality and practical farm management for cage and pond fish farmers, attracted a total of 550 farmers over 10 days.

The emphasis was on linking farm and feed management to profitability and focused on simple, practical approaches that could be adopted by farmers regardless of their technical background. The presentations provided basic background on important environmental parameters that have an impact on production and simple ways of monitoring and managing these. For example, Dan Fegan, Cargill's aqua technology manager for Asia, explained how to use water colour as an indicator of environmental conditions in catfish ponds and ways to manage it to maintain good growth.

"One common misunderstanding among catfish farmers is that, because catfish can breathe air, dissolved oxygen is not important. However, dissolve oxygen has an important impact on many biological and chemical processes in the pond that can contribute to stress, increased disease risk or a reduced value for the fish as a result of impacts on skin colour and appearance."

The importance of temperature was also emphasised as it has a major impact on cold-blooded species such as fish and also on the overall pond ecosystem. "Although farmers cannot control the weather or the temperature, it is important that they understand the impact of temperature variation and manage the ponds, and feeding, accordingly to avoid unnecessary cost."

According to Riduan Effendi, Cargill Indonesia's aqua technology manager, farmers appreciated Cargill team's willingness to listen and to share feedback on possible areas to improve farm performance.

"An advantage with partnering with Cargill is that we regularly provide these types of technical seminars. In this case we do not sell products or additives for solving water quality problems so our customers value the discussions and trust us to provide unbiased opinions and advice."

Edi Prijono, Cargill Indonesia's aqua sales manager, commented, "The seminars also provided a good opportunity to communicate with our customers. The Q&A discussions were lively. A common message from our customers is that they appreciate our continued emphasis on improving their farms' performance by providing high performing feeds and personal service. This was a welcome confirmation that our focus on creating value for each individual farmer is the right way to go."

BIOMIN Asia expands sales team

"In Asia, there is a rising demand for mycotoxin deactivators and natural growth promoters as alternatives to antibiotics. We want to be closer to the market and our customers. Biomin is a customer-oriented company and being there for our customers is extremely important for us. Therefore we see the need to expand our local sales team in order to serve our customers better," says Jan Vanbrabant, CEO, Biomin Asia.

Yatie Setiarsih joined Biomin in 2007 as the technical manager for Indonesia. After graduating from Bogor Agriculture Institute with a degree in Veterinary Medicine, she accumulated 16 years of hands-on experience in sales and technical roles. Her expertise lies in animal nutrition, feed manufacturing and quality assurance. Yatie has made significant contributions to the growth of Biomin's business in Indonesia. With the establishment of the new business entity, Biomin Indonesia, she is the ideal fit for the role of chief operating officer. Supported by the local business partner, PT Romindo, Yatie will continue to grow the business in Indonesia.

Mark Olley

Yatie Setiarsih

Mark Olley holds dual roles as the chief operating officer for Australia and New Zealand and he is also the regional director overseeing business in Indonesia, Philippines and South Korea. Mark received his Bachelor degree in Agricultural Science from the University of Queensland. Since then he has worked for Australian and international corporations in the Asia-Pacific region, specialising in sales and business development. With more than 15 years of relevant experience in the animal production industry, Mark has made significant contributions and achievements during his career. Prior to joining Biomin, he held the post of general manager with a Belgium-based company.

Time is right to talk on acids at the 1st International Acidifier Summit

This was held during VIV Asia 2011 on March 9th in Bangkok. At this summit hosted by ADDCON, experts discuss how acids can help to prevent spoilage of feed, increase feed safety and maximize feed efficiency. Bernd Kochannek, CEO and owner of the Germany based Addcon Group of companies opened the summit.

"We have entered again a time when prices of feed ingredients are rising steeply on a daily basis. Inflation is driven by agflation. Higher demand for feed ingredients is driven by higher demand for animal protein due to a rising world population with higher disposable income, competition for feed by the biofuel industry and last but not least by investment funds who are stating that "Agriculture commodities are in a long-term bull market, and definitely have a place in one's portfolios," said Kochannek.

"As such, the feed industry is still in competition with its old rivals but at the same time the feed industry will have to make sure, that it is getting its share of high quality raw material for its customers." He added that neither the feed, nor the bio-energy industry can continue to lose precious nutrients due to microbial and fungal spoilage. Preserving raw material will be crucial in order to meet tomorrow´s demand.

"Customers become more and more sensitive on safety and ethical issues. With increasing disposable income, parents are keen to feed their kids good and high quality food. High quality is no longer determined by the nutritive value of a meal only, but food safety has become a major concern globally. Whether justified or not, the ban of antibiotics in feed in Europe is being followed by other countries in Asia too. Also this trend will be a challenge for the industry to meet."

"There is plenty of evidence that organic acids work in poultry and swine diets, but there is much less data about aquaculture" said Prof. Wing-Keong Ng from the Universiti Sains, Malaysia. In his presentation Ng stated that the ever growing aquaculture industry in Asia has started to look for alternatives to antibiotic growth promoters (see box).

The summit ended with a lively panel discussion, lead by Prof. Bob Swick, Professor of Poultry Nutrition at the University of New England in Armidale Australia. The panel members agreed that there is plenty of information on the use of organic acids available. If applied in the right dosage, organic acids will be a key ingredient in every feed diet. At the same time, all panel members stated, that research in organic acids is ongoing in order to support the trust in organic acids by the industry.

Addcon is committed to be a leader in the application of organic acids in animal nutrition and feed preservation. As such, it has announced that the next International Acidifier Summit will be held in 2012 in Germany. The proceedings of the summit "Standards for acidifiers", edited by Dr. Christian Lückstädt are available from Nottingham University Press or from Addcon directly. For more information, email: info@addcon.com

Organic acids in aquafeeds

Diseases are a major problem encountered in the intensive aquaculture production. The inclusion of antibiotics in aquafeeds to combat pathogenic organisms or to boost fish growth is commonly practised, especially in Asia. The prophylactic use of antibiotics in aquaculture has been increasingly criticised which eventually led to their being banned in animal productions by the European Union in 2006. Since then, organic acids and their salts or mixtures have received considerable attention in aquaculture.

There are several studies which report that some organic acids, particularly citric and formic acid and their salts, can improve growth, feed utilisation, mineral availability and disease resistance in fish. Nevertheless, it was pointed out that despite the promising findings, contradictory results show that effects depend on the fish species, physiology, age and/or type of organic acids used.

"We have encouraging data from feeding trials conducted at the university which showed that various dietary organic acid blends and potassium diformate have great potential in replacing antibiotics use in tilapia feeds," said Ng (left in picture).

"We had done a study in tilapia using various blends of organic acids and tested it against a negative control and a positive control. The positive control was potassium diformate which seems to have the most consistent and reliable data. What we found was that organic acids can have a very positive effect on health and growth of tilapia."

However, more research efforts are required in order to fully understand the mode of action of organic acids in aquatic animals.

Title: Application of organic acids in aquafeeds: impacts on fish growth, nutrient utilisation and disease resistance by Ng W.K. & Koh C.B. (2011).

Mobile PCR lab for shrimp farmers

POCKIT is a less than USD5,000 novel on-site qualitative Real Time PCR detection system. It is based on insulated isothermal PCR (iiPCR) developed by GeneReach Biotechnology Corporation, Taiwan. The company has developed IQ2000 and IQ REAL shrimp virus detection and prevention system. IQ Plus is the newly developed kit for POCKIT system on shrimp virus detection, both for DNA (WSSV and IHHNV) and RNA viruses (IMNV, TSV, YHV and PvNV).

iiPCR - the next generation PCR

iiPCR is based on the Rayleigh-Bénard convection PCR principle. Natural thermal convection phenomenon is induced inside a capillary tube with a constant temperature of 95°C applied at the bottom from one side of POCKIT, which results in a temperature gradient between 60°C to 95°C inside the tube. The capillary tube is insulated by an aluminum block to prevent disruption of the thermal convection by irregular heat dissipations in the environment. Also, the heat source is insulated so the heat is only released at the point of contact with the tube from one side of the bottom of the kit. The convection will, in turn, repeatedly transport the reagents through different temperature zones (95°C, 60°C and 72°C) for the three steps of PCR cycle – nucleic acid denaturation, annealing, and extension in the presence of the PCR components such as primers, dNTP, and Taq enzyme (Photo 1).

Simple and inexpensive

Since iiPCR needs only a single heating source, a thermal cycler is avoided. This keeps cost low and also saves more lab space. Moreover, GeneReach is capable of integrating the most advanced technology of optics, electronics and software from Taiwan, and therefore can provide a high quality product and keep the price reasonable. In addition, POCKIT provides two-channel fluorescence detection for multiplex signals and displays immediate positive (+) or negative (-) results on the touch control LCD screen.

One program for DNA and RNA virus

The reaction starts at 45°C for the first 10 minutes, and then runs iiPCR for 30 minutes. Both DNA and RNA target can be run at the same time with only one program. Users can detect eight targets from one sample or eight samples for one target on the same POCKIT. The turnaround time takes only 50 minutes.

IQ Plus - a qualitative real time kit

The amplification reagent of IQ Plus is based on Taqman® Probe Real Time PCR. Inherited from IQ2000, it also provides the internal and positive control for users to ensure their detection quality and performance. The reporter dye for target virus is FAM and for internal control is JOE respectively. POCKIT detects those fluorescence signals and displays the results as positive (+) or negative (-). immediately after the amplification procedure (Photo 2). The reagent is lyophilized and can be shipped at room temperature for 7 days. IQ Plus also includes a newly developed spin column-based DNA/RNA co-extraction kit which allows users to extract the DNA/RNA in 10 minutes.

The mobile PCR lab

A hard-surface carry-on suitcase is used to pack POCKIT, a mini-centrifuge and two fixed volume micro pipettes as a portable PCR lab (Photo 3) for detecting viruses anytime anywhere.

More information: www.genereach.com Email: sales@genereach.com

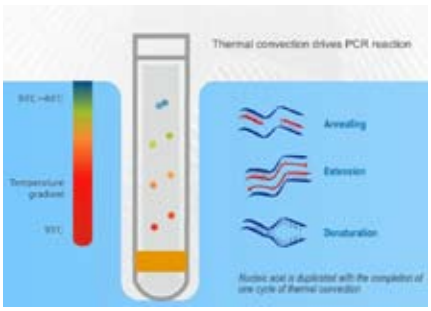


Photo 1. The concept of iiPCR (insulated isothermal PCR)

Photo 2

Photo 3

Animal nutrition company acquires shrimp genetic company

Animal Nutrition and Feedmilling Group GOLD COIN has announced that they have acquired full control of Shrimp Genetic Company SyAqua since April 2011.

Gold Coin Group CEO, JC Filippi, said, "The key objective of this strategic acquisition is first to offer an alternative to Asian shrimp farmers, combining technical and commercial synergies between nutrition and genetic to enhance shrimp production performances and therefore farmers profitability ".

Tycho Vos, the newly appointed managing director of the SyAqua Group said, " In the last 10 years, SyAqua has developed a unique and strong genetic and breeding program targeting improvements in growth performance, robustness and resistance to diseases. New technologies and resources are now being used within our facilities focusing on and addressing the new industry challenges and market expectations."

Dr. Thomas Gitterle, previously head of the Genetic and Breeding Department at CENIACUA (Colombia) and scientific advisor to AKVAFORSK Genetic Center (Norway), is now the new technical director of SyAqua in charge of genetic improvement and development. Gitterle will also oversee a numbers of research initiatives and activities including a nutrigenomics project in Singapore and a research program in Indonesia for IMNV. SyAqua's main genetic nuclei are located in Thailand as well as in Singapore.

SyAqua presently operates commercial hatcheries producing post larvae and nauplii both in Thailand and Indonesia and exports commercial broodstock in the region. Gold Coin is a pioneer in animal and shrimp nutrition with its first aqua mill built in Malaysia in the early 1990's. Gold Coin specialises in livestock and aqua feeds and is market leader with a presence in 8 Asian countries.

More information: Email: tycho.vos@goldcoin-group.com (Tycho Vos)

Single cell protein to boost immune systems

Protein sources used in aquaculture are typically derived from plant and animal sources. Fish meal, while in ample supply today, will not remain so. Market and social pressures are making the use of fish meal increasingly less desirable and the need to find suitable substitutes is becoming an ever increasing priority.

A variety of alternative sources are being explored among which is the use of microbial derived single cell protein sources. Production of the microbial biomass solely for this purpose would not usually be economically feasible given the technology required, so the use of waste products from other commercially viable processes has to be considered.

Nucleoboost is a Single Cell Protein (SCP) derived from microbial sources that contains more than 70% protein, nucleotides (8%) and LPS (lipopolysaccharide). This protein source is inexpensive, contains nucleotides that are essential for optimal lymphocyte function and is also immunogenic, resulting in nonspecific immune activation, enhancing this component of the immune system in animals that are fed the material. This is a byproduct of the lysine fermentation industry.

The bacteria used to produce lysine are harvested and all of their genetic material is destroyed by being broken into individual components (nucleotides) by the use of enzymes. This is done to ensure that there are no complete genes within the final product and offers a measure of comfort to companies that are concerned about using microbial cells as a component of a feed ration. These dried cells are then coated with soybean oil to ensure that they do not readily form a dust. This ensures that the highly immunogenic LPS do not pose a health hazard. A representative analysis of the cells indicated >73% (dry weight) of crude protein, 6.7% crude fat , 2.1% ash and 5% moisture.

Aquarium, small scale trials in which post larval shrimp were fed a diet containing this material at an inclusion rate of 1% demonstrated that there were no negative effects on growth or on palatability. The product is currently recognised as GRAS in the USA and is being used in suckling pigs. The company is seeking progressive feed mills and potential distributors.

More information: Aqua-In-Tech Inc. www.aqua-in-tech.com email: sgnewm@aqua-in-tech.com (Stephen Newman)

Aquatic Eco-Systems Inc. acquires Green Sky Growers

Aquatic Eco-Systems Inc. (AES) of Apopka, Florida, USA has announced that it has acquired Green Sky Growers, also based in Florida. As a result of the acquisition, AES, operating under the name Green Sky Growers, will continue the hydroponic and aquaponic operations started by Bert Roper, on the basis of promoting sustainable living and best practices.

In a statement, Roper said, "The Roper family is pleased to welcome Aquatic Eco-Systems as the new owner of Green Sky Growers. AES has over 30 years of industry expertise and a worldwide outreach, and their innovative research of aquaculture and hydroponic techniques will continue at Green Sky Growers as AES uses the rooftop site for both food production and as a learning facility for their clients from all over the world. We are delighted to have AES join our community and bring their distinctive international know-how to Winter Garden."

AES founded in 1978, has more than 13,000 products to serve a variety of aquatic interests and industries, from aquaculture and lake management to aquariums and water gardens. With this acquisition, it will carry out operations at Green Sky Growers in the same manner and aims to take both companies to the next level of success. Todd Childress, president of Aquatic Eco-Systems, said, "At AES we have been at the forefront in the development of innovative rooftop and urban growing systems. With Green Sky Growers, we are able to combine state-of-the-art technology with conventional and innovative growing techniques."

Green Sky Growers will be a one-stop solution for new design ideas, existing garden troubleshooting, education and installation assistance. The facility will cater to commercial growers exploring new agricultural opportunities, homeowners looking for ways to efficiently grow plants and/or fish in their own back yard and those looking to tackle the emerging need for urban gardening. Childress looks optimistically to the future, concluding, "It is our hope that Green Sky Growers will become synonymous with expert advice, the best quality products and the exceptional customer service that Aquatic Eco-Systems has provided the past 33 years."

More information: www.GreenSkyGrowers.com; www.AquaticEco.com

World Aquaculture 2011

Aquaculture on track in Brazil

Aquaculture for a changing world was the 2011chosen theme, and nowhere has the change been more significant than in Brazil. Reports Eric Roderick

This year's event was run in conjunction with **Fenecam**'s 8th International Shrimp Farming Symposium and Seafood Festival ensuring a good turnout for this annual event held each year in Natal. With 50 scientific sessions, 1250 submitted abstracts, over 900 posters, 300 exhibitors at the trade show and 4390 registered attendees from over 90 countries, this was a huge event.

Brazil is one of the countries with the highest growth in aquaculture worldwide, and with a coastline of 8500 km, and 12% of the world's freshwater reserves of which 10 million hectares is made up of freshwater reservoirs many of which are associated with hydroelectric production ensuring reliable electricity supply to the regions industries.

Natal is the capital city of **Rio Grande do Norte** state, and is the largest shrimp producer in Brazil, accounting for 40% of all Brazilian production. The local people are called "Potiguas" which in the Tupi language of the native Indians means "shrimp eater".

Brazil is currently 17th in terms of world aquaculture production, but plans to be 10th place by 2015 with some ambitious government backed expansion plans in place. With production of 500,000 tonnes estimated for 2011, MPA believes that Brazil can produce 1 million tonnes by 2015, and 10 million tonnes by 2020. A key driving force in this expansion is the elevation of the Fishery and Aquaculture Sector to the level of Federal Ministry giving it vastly more status, powers and recognition. The new Ministry of Fisheries and Aquaculture (MPA) set up in 2009, has implemented several National Aquaculture Plans which have greatly increased areas available for fish farming, reducing bureaucracy and promoting sustainable and regulated use of Brazil's resources. MPA have invested in infrastructure, logistics, credit facilities, education and training courses, setting up of cooperatives, and promoting healthier and safer fisheries and aquaculture products in the domestic market with minimum environmental conflicts.

Shrimp production (almost exclusively *Penaeus vannamei*) in Brazil reached 80,000 tonnes in 2010 in an area of 18,500 ha with 98% of the production consumed domestically, compared with only 22% in 2003. This massive increase in domestic consumption came about due to currency exchange fluctuations, which made exporting uncompetitive, so exporters were forced to concentrate on the domestic market, which proved the saviour of the whole aquaculture industry. Brazilians currently consume 9kg of seafood per capita, and MPA is looking to increase this to 12kg soon.

Tilapia is now the number one aquaculture species in Brazil, accounting for 40% of all finfish cultured in Brazil, exceeding 150,000 tonnes in 2010, growing at a rate of 14% per year. Tilapia was first introduced to Brazil in 1971 from the Ivory Coast, West Africa, but it was not until the early 1990's when genetically improved stocks, (GIFT, Chitrilada and Fishgen's YY male technology) were introduced to Brazil that production really escalated. Also, high density cage culture was started in the larger water bodies combined with monosex culture, improved locally produced feed and a far greater awareness of tilapia as an excellent food source. Fee fishing for tilapia also really took off in certain States, and many new processing plants were built and certified, mainly for export to the rapidly expanding American market. However, because of the poor exchange rates, the producers soon

Tilapia farm and hatchery in Southern Brazil, where winter temperatures are low hence the polytunnel covers over some of the broodstock ponds to increase fry production in the colder months.

Michael New, OBE, Aquaculture Without Frontiers founder (right) and Ricardo Martino, WAS president at the AWF fundraiser.

Trade stand display showing examples of the native Brazilian food fish. Tambaqui (Colossoma macropomum) - the most popular Brazilian food fish, along with a few "fingerlings" of Araipaima gigas or picarucu - the world's largest freshwater fish.

Pintado (Pseudoplatystoma sp.) a very tasty popular native catfish and the skin is also used for leather production.

Dr Ricardo Martino from Brazil (left), discussing the conference with Dr Kevan Main, Director of Mote Marine Lab's Center for Aquatic Research and Development in Florida.

started focussing on the domestic markets and there is virtually no export of tilapia today. The government is also promoting and providing financial support for small scale tilapia farming in the poorest regions ensuring food security and employment for the very poor families.

With the huge amount of freshwater resources available in Brazil, many large companies are expanding into tilapia farming, with **Netuno International**, a Recife based company 50% owned by Japan's Nissui group planning to quadruple its tilapia production from 10,000 in 2011 to 40,000 by 2015. Netuno currently exports 1.7 million lobster tails annually (a third of all Brazilian production) and almost 5,000 tonnes of shrimp a year. Another Brazilian company **Geneseas** in Sao Paulo is also looking at expanding its tilapia operations significantly.

The aquafeed industry is also extremely important for Brazil's expansion plans. Brazil is the largest animal feed producer in Latin America, and is third in the world after the USA and China. Some 60 million tonnes were produced in 2010, but of this total, aquafeed is less than 0.7%. Brazil currently produces soybean meal and oil, yellow corn grains, corn gluten meal, sorghum, wheat and the by-products, cottonseed meal, poultry by-product meal, meat and bone meal, fish meal, brewers and distillers by-products, vitamins and minerals. In 1992 production of extruded fish feeds started in Brazil which helped increase fish yields dramatically.

Brazil is currently involved in many International collaborations including one with Peru, where the Peruvian government is assisting Brazil in the utilisation of its vast reserves of small marine fish, currently not commercially fished. In return Brazilian scientists are assisting Peru in technology transfer for the farming tambaqui *Colossoma macropomum* and pirarucu *Arapaima gigas*, a native Brazilian freshwater fish.

Tilapia leather garments including a tilapia skin bikini locally produced.

Along with the introduced tilapia and shrimp, there are many endemic species currently being farmed and actively promoted by MPA. There are 4 main groups of freshwater fish of which tambaqui is the most important, with 38,833 tonnes farmed in 2009. It is a hardy omnivorous fish that can adapt to poor water quality and low oxygen as it has specially adapted lips to gather oxygen rich water from the surface. It can grow to over 3 kg per year. Pacu (*Piaractus mesopotamicus* and *P. brachypomus*) is also widely cultured. It is mostly vegetarian and is cold tolerant. Tambaqui and pacu are often hybridised and 26,500 tonnes of pacu and the hybrids were farmed in 2009. Pintado (*Pseudoplatystoma corruscans* and *P. reticulatum*) a carnivorous catfish is cultured as a pure species and also as hybrids. In 2009, 2,120 tonnes were reportedly produced in 2009 but production is often under-reported. The other main native freshwater farmed fish is the pirarucu, the largest freshwater fish in the world, growing up to 150 kg, and with fast growth of 10 to 12 kg per year. It is an air breather and has a high tolerance of handling and managing, and produces excellent boneless meat. It is a carnivorous fish requiring high quality 38% protein feed. Currently culture is limited to less than 100 tonnes due to more research required to improve fry production and generally improve culture technology.

Brazil's shellfish production is mainly around Santa Catarina State in Southern Brazil with 12,462 tonnes in 2009, representing 92% of Brazil's total shellfish farming production. Main species farmed are Mussels (*Perna perna*) with much lower production of Pacific Oysters (*Crassostrea gigas*), and very little Scallops (*Nodipecten nodosus*). Spat production technologies limit further expansion, but new research should increase production, as well as expand culture regions and satisfy better hygiene controls. In the Natal region, Artemia is also farmed and there are many native freshwater shrimp which could be farmed as well as some farming of the introduced *Macrobrachium rosenbergii*. Local marine finfish species are currently being evaluated for culture potential, with cobia (*Rachycentron canadum*) farms already set up in the region. Other species farmed on an experimental basis are some Mullet species (*Mugil* spp.), seahorses (*Hippocampus reidi*) and seaweeds (mainly *Gracilaria* sp.) In the cooler south east of Brazil introduced rainbow trout and carp are farmed along with many species of ornamental fish and frogs.

The take home message from the conference is that Brazilian Aquaculture is growing dramatically, and with full government support, there is no doubt that they are on track to succeed.

World Aquaculture 2011 trade show

More than 150 companies were represented in Natal Brazil, showcasing the wide range of products and services on offer to the Brazilian aquaculture industry.

Alltech Algae booth

Aquativ group (from left) Gianni Yepez (Ecuador), Maria Eugenia Peigneguy Moreira (Chile), Dr Vincent Fournier and Thomas Levallois

Nutriad Brazilian team lead by Marcelo Manjabosco Nunes (centre right)

Intervet/Schering-Plough Animal Health Robin Wardle (right), Neil Wendover (second left) and the Americas team.

Interviewing Stephane Ralite (right) from Ocialis/ Evialis group of companies.

Feed and **feed ingredient companies** made up the bulk of the exhibitors, mostly in very large elaborate and highly professional booths. Many of the companies were well known global brands, with local representation here in Brazil highlighting the importance of the rapid expansion of the Brazilian industry globally. Most of the exhibitors reported a busy show, and there were always a large number of people talking to exhibitors.

INVE had a prominent booth and was always busy, and Patrick Lavens reported that more than 50% of shrimp produced in Brazil utilise INVE products. Most of the production is imported *Penaeus vannamei*, but there is a lot of interest currently in some endemic species of shrimp. **Evialis** had a very large booth and was representing Ocialis, BernAqua, Presence and several other leading brands, mostly concerned with shrimp feed and hatchery feeds. Stephane Ralite said they were launching Vitellus here in Brazil, which is decapsulated dead artemia cysts with all the nutrient content preserved intact, designed to be fed directly to fish and shrimp larvae. The company also supplies feed ingredients to the local Brazilian feed companies, particularly in the feed for the culture of native Brazilian carnivorous fish, such as pintado and cobia.

Alltech's booth prominently displayed the Alltech Algae banner, highlighting Alltech's renewed commitment to utilising algae in fish feeds and additives. They were well represented by the Alltech Brazil team, and Dr Jorge Arias, head of Aquaculture for Alltech was very busy at the booth discussing Alltech products with old and new clients. They are making excellent progress in Latin America. **Aquativ**, a French company with bases around the world specialising in functional hydrolysates for fish and shrimp feeds were launching a new range of highly concentrated marine based functional hydrolysates, both liquid concentrates and spray dried powders. Their hydrolysates have a superior concentration of natural active nutrients (low molecular weight bioactive compounds mainly bioactive peptides, amino acids and nucleotides, generated by their unique hydrolysis process) improving feed performance, animal growth and ultimately overall productivity.

Nutriad based in Belgium is an international feed additive company providing products and services to over 80 countries. The company is represented here in Brazil by Marcelo Manjabosco Nunes the Director, and supported by Dr Peter Coutteau from Inve Aqua Additives. They launched a series of new products tailored for the Brazilian market at the show, which included 'Aquagest' a digestibility enhancer, for shrimp and fish, 'Aquabite' attractant and palatability enhancer, 'Sanacore' a multi angle defence complex to reduce disease incidences and 'Apex', natural bioactive ingredients.

Under the health care category **Intervet/Schering-Plough Animal Health** sponsor of the FinFish Health session, offered a lot of advice and demonstrations through their specialist team headed up by Robin Wardle and his team including Neil Wendover, the Asian technical manager. Following the launch and approval of their *Steptococcus* vaccine AquaVac for tilapia in Indonesia, there was a lot of interest here in Brazil, with tilapia being such an important aquaculture species. As with any rapidly expanding industry, there will be disease issues and it seems that the Brazilian aquaculturists are being proactive in this area.

Amongst the very diverse trade show were two large and prominent booths representing the two big banks in Brazil. This highlights the serious commitment given to aquaculture by the main financial institutions and emphasises the massive government support to ensure the industry continues to expand. There were also several companies exhibiting who are involved in aquaculture certification again showing the increasing importance of standards and environmental awareness.

One very large booth was taken by **FIERN**, which represents Aquaculture Industries in the Natal region, with many affiliated organisations represented including **SENAI**, which offers high quality professional education, technical and technological services and promotes innovation to the state's industries. One of the companies showcased there makes leather mainly from tilapia skins. There were several impressive displays of goods, all of which looked amazing.

At the World Aquaculture 2011, Natal, Brazil

First results in use of B-safe feed additives in tilapia

The first results on the use of B-safe feed additives (Neovia, France) were presented by Pascal Boisot, Phong Huy Dao, Gaëlle Benzoni, and Alain Guyonvarch. They described the findings of a study conducted at the IN VIVO NSA research centre in Vietnam. The use of B-safe resulted in a significant increase in growth (+9.5 to +10.8%) and a significant reduction of feed conversion ratio (-11% to -12%).

B-safe is a patented cation exchanged clay and is one of five products in feed additives range of IN VIVO NSA group, a French leader in premixes, mineral supplements, nutritional specialties and salt licks. Cation exchanged clays have been reported to be an effective antibacterial material and the interest as a growth promoter factor has been reported in terrestrial species such as poultry. The authors indicate that to their knowledge, the interest of cation-exchanged clays has never been studied in fish species.

The study involved 1,920 fish (*Oreochromis niloticus* x *Oreochromis mossambicus*) of average initial weight of 27.2+2.6g, divided in 3 groups of 640 fish. Each group was subdivided in 8 cages of 2.5 m^3 (80 fish/cage). Cages were placed in a fresh water pond. Fish were fed to apparent satiation for 38 feeding days with a commercial type feed (protein:31%, fat: 4.5%, fibre: 4.5% and starch: 20%) with or without a patented cation-exchanged clay. Individual body weights were controlled at the start and at the end of the study. Daily feed consumption and daily mortality per cage were also recorded.

The authors said that despite the additional cost of B-safe, feed cost to produce 1 tonne of fish was reduced by about 10% at the two doses. In conclusion, results of this study demonstrate that B-safe can have a zootechnical and economical interest in growing tilapia and that a dose of 2kg/tonne was optimal in the environmental context of this study.

Table 1. Main results (Mean± standard deviation).

	Group 1 : Control	Group 2 : Bsafe SD 2kg/ tonne	Group 3 : Bsafe SD 3kg/tonne	P-Value
Initial weight	27.3 + 2.6	27.0 + 2.7	27.2 + 2.6	ns
Final weight (g)	129.0 +20.8[a]	138.3 +22.2[b]	139.4 + 21.6[b]	<0.001
Daily weight gain (g/day)	2.08 + 0.15[a]	2.28 + 0.10[b]	2.31 + 0.13[b]	<0.001
Mortality (%)	2.03 + 1.48	1.72 + 1.33	1.09 + 1.24	ns
Daily feed consumption per fish (g)	3.50 + 0.10	3.45 + 0.10	3.46 + 0.09	ns
FCR	1.71 + 0.11[b]	1.53 + 0.08[a]	1.51 + 0.08[a]	<0.001
Feed cost to produce 1 tonne of fish (Euro)	537	483	481	

ns: non significant
[a,b]: means with common superscripts are not significantly different from each other at the 5% level

More information: email: neovia@invivo-nsa.com (Sandrine Durox)

Better protein and energy with fermentation product

Research conducted by Dr Wutiporn Phromkunthong, Associate Professor and Head of the Kidchakan Supamattaya Aquatic Animal Health Research Center at the Prince of Songkla University, Thailand on the effect of DVAQUA® on the ingredient digestibility in tilapia was presented by Dr. Brian Hunter, Diamond V Asia.

The basis for the research study was to determine if adding a commercial nutritional fermentation product (DVAQUA) to feed mash, before pelleting, to juvenile sex-reversed tilapia would increase digestibility and possibly increase opportunities to formulate less expensive diets. Diamond V, headquartered in Cedar Rapids, Iowa, USA, is the world's leading supplier of nutritional fermentation products used to optimize digestive function and nutrition key to animal and aqua health, productivity, efficiency and profitability.

Hunter stated, "The value to the industry is to show how DVAQUA can help increase feed digestibility, and permit lower cost formulations. This is especially important now; since raw material prices have sky rocketed these past two years, and has affected the profitability of feed millers and farmers."

Hunter noted that further research is planned to determine the effects of DVAQUA on improving growth and feed efficiency in juvenile sex-reversed tilapia. See page 26 for full article. More information: Web: www.diamondv.com.

Skretting Australasian Aquaculture 2012 (AA12)

This is the fifth biennial conference and trade show for the Australian and Asia Pacific aquaculture industry. Pheroze Jungalwalla, Chair, Skretting Australasian Aquaculture 2012 said, "Developments in research continue to lead to improvements in aquaculture production. Whether it is genetic improvement of farmed species, advances in health management, increased production efficiency, or higher product quality for consumers - the aquaculture industry continues to develop innovative and sustainable practices".

Skretting Australasian Aquaculture 2012 'The Next Ten Years' will provide a valuable opportunity for presentations from academia, researchers and industry, facilitating the meaningful exchange of information amongst the aquaculture and related industries and inspiring all participants to contribute to the future. AA12 will provide a forum for education, knowledge transfer, and development of new skills along with professional development of all sectors within the industry. It is also to keep up with global developments; immerse in challenging presentations, conversations and debates with thought leaders, and network with aquaculture champions.

The conference and trade show will be held from 1- 4 May 2012 at the Melbourne Convention & Exhibition Centre, Victoria, Australia. Organisers have issued a call for papers with a deadline of **15 September**. Online submission is encouraged to the conference website: www.australian-aquaculturepportal.com.

9AFAF – success with "Better Science, Better Fish, Better Life"

The 9th Asian Fisheries and Aquaculture Forum (9AFAF) was held from April 21-25, 2011 at the new campus of Shanghai Ocean University. It was organised by the Shanghai Ocean University and Asian Fisheries Society (AFS). This is the ninth triennial forum for the society, following the one held in Kochi, India in 2007.

Dr I-C Liao (front middle) and Dr N-H Chao, Taiwan Fisheries Research Institute (right) with Taiwan's industry and academicians; standing from left: Mao Sheng Liu and Peter Chiang, Taiwan's Urbini Group, LLC, SM Hong, Dr Chien Yew-Hu, National Taiwan Ocean University, and seated left, Elaine H Chang (Urbini group)

At the nutrition session, Yan Min Xue, Feed Research Institute in Beijing was session co chair (left) and Dr Orapint Jintasataporn, Kasetsart University, Thailand (middle) presented using mulberry silkworm to increase omega-3 fatty acids in nile tilapia and Yan Jia-qu, Shanghai Ocean University , discussed the cultivation and lipids of microalgae in coastal habitats.

This international forum brought together leading aquaculture and fisheries scientists and key commercial stakeholders to discuss a range of topics from aquaculture nutrition, culture systems, biotechnology to sustainable aquatic resource production to utilisation and management in the Asia-Pacific. There were 22 concurrent sessions including two symposiums, the 9th International Symposium of Tilapia Aquaculture (9ISTA) and the 4th International Symposium on Stock Enhancement and Sea Ranching (4ISSESR),and three special sessions: Strengthening European and Asian Partnerships, Genetic Resources for Sustainable Fisheries and Aquaculture and Gender in Aquaculture and Fisheries.

The program started with the opening ceremony led by Pan Ying Jie, President, Shanghai Ocean University. The address by Xing Wu Zhao, Minister, Bureau of Fisheries, Ministry of Agriculture, People's Republic of China covered the focus China has in fishery and aquaculture with 130 prefectural level fishing colleges and research institutions and more than 6,000 staff. In 1988, China produced only 5.32 million tonnes of aquatic products and this rose to 11.52 million tonnes in 1989. At the end of 2010, the output expected was 38.29 million tonnes with marine aquaculture contributing 14.82 million tonnes or 38.7% and freshwater aquaculture contributing 23.47million tonnes or 61.37%. China's output is 62% of global production and 70% of the Asian production. Export of freshwater products from China totalled 5.9 million tonnes in 2010.

Ida Saison, president, AFS also delivered her welcome address to participants. She said that this forum was unique in several ways. Besides being held in this new campus, it also marked the 25th anniversary of the first Asian Fisheries Forum which was held in Manila, the Philippines and the 27th anniversary of the Society. It was also the first time that aquaculture was added into the forum focus, a resolution made at the Kochi meeting.

Better Science, Better Fish and Better Life

According to Dr Meryl Williams, Asia Pacific has a dominant position in aquaculture accounting for 70% of the world's production and with 12 Asian countries making the "F20" list as top fish producing countries. This region has a work force of 40 million workers in the fish production sector. But there are issues to address-ranging from trade wars to to contamination of melamine and antibiotics in fisheries products, anti dumping with shrimp products and with many countries putting volumes ahead of sustainability and environmental issues. Williams told the audience that 'the dominance in production does not translate to dominance in the market place'.

In Better Science, the aquaculture surge demands major research investments. Success has come from science plus farmer innovations and agriculture experiences have taught us that productivity needs continuing research investments for good market returns. Finally in Better Life, Williams said that this is building the skills and knowledge of people in both fisheries and aquaculture, as skilled people run better businesses and develop better policies. Williams concluded that better fish, science and life bring the Asian Pacific industry into the driver's seat among the "F20" top fish producers.

Better Science

Genetic improvements is one of the most powerful approaches to increasing aquaculture production, said Professor Li Si Fa, Shanghai Ocean University and also 'the father of tilapia and aquaculture in China' in his plenary lecture on 'Better Science'. The benefits of fish consumption mean that the annual per capita will rise to 23.3 kg/capita from 17.2 kg/capita in 2009. This requires an annual production of 82 million tonnes for 2050, according to FAO data. In China, the rural population consumes only 5 kg of aquatic products as compared to 13 kg/capita by the urban population. If the population were to shift towards the urban group to 70% from the current 46%, then there will be an enormous and latent market for aquatic products. Li said that even if it is at status quo, China would still need an additional 5.4 million tonnes by 2010 and if the per capita consumption rises to 40 kg/capita, the requirement will be another 11 million tonnes.

Dr Meryl Williams (right) and Angela Lentisco, FAO, Bangkok, Thailand

At Chuan Heng Corp, Mendy Luo (right) and Jeff Zhang

Professor Patrick Sorgeloos

Prof Qingyin Wang, Yellow Sea Fisheries Research Institute, Qingdao and Jack Morales, Sustainable Fisheries Partnership (right)

From left, Dr Roshada Hashim, Universiti Sains Malaysia, Dr N-H Chao, Taiwan Fisheries Research Institute and Choo Poh Sze, Editor, AFS Journal

Growth of aquaculture is constrained by limited land and water, and fish meal supplies for feeds. However, genetic improvements can provide 40% of the increase in production. In Norway, genetically improved strains account for 80% of farmed salmon. The developments with salmon brought production to 784,000 tonnes in 2010 and improved strains account for 80% of this production and feed conversion ratios improved from 3.5 to 1. In Asia, genetic improved strains have been developed for common carps with the red and jin common carp and for the crucian carps, there are the allogynogenetic silver and triploid crucian carps. The Pujiang No 1 blunt snout bream was developed after 16 years of selection. The F6 generation showed 30% improvement in growth and better body shape. The F10 generation was produced in 2010 and these strains account for 50% of bream production. In all, Li said that the cost benefit of breeding programs is more than 50 times. In the above breeding programs, the cost was RMB 200,000/year and the estimated profit per year from the bream production was RMB 10 million.

However, it was the genetic developments with the tilapia which propelled China to be a major producer of fish. Tilapia moved from the GIFT developed by a consortium of centres to NEW GIFT developed in China. The national selection program target was growth from 500 g to 750 g in 5-6 months; fillet yield increase to 40% from 33%. Through 9 generations in 9 years, the output was a new variety in 2005 which has a SL/BH of 2.18 and fillet ratio 5-8% higher than the common tilapia. In 2010, a new GIFT was produced with better performance and attributes where farmers showed growth of 750 g in 5-6 months, a production of 1-2 tonnes/mu/crop and 1-2 crops in the south and 1 crop in the north and net profit was 1-2 RMB/kg. Processing plants attested to the high fillet yield of 40%. Li concluded that the introduction of new breeds and upgrading the genetic potential are keys to the dramatic development of the industry in China. China has also developed a saltwater tolerant strain called the Jili tilapia in 2010. This is suitable at salinity of 15 to 25 ppt. It grows to 500 g in 5-6 months, has no muddy taste and has higher prices than the freshwater strains.

However, the contribution of genetics to aquaculture still lags behind. For culture species only 6.1% of species in the world comprise genetically improved stocks with 12.7% in China. In terms of volume, these are only 21.7% globally and 32.3% in China. The potential for production increases with genetic stocks, has been shown with the salmon and blunt snout bream. The future will include molecular technology and chromosome manipulation and moving away from traditional breeding and selection approaches.

Better Life

This presentation by Professor Patrick Sorgeloos, Ghent University, Belgium looked at Eastern versus Western approaches to aquaculture, the conflicts and problems shared and the common strategy for a 'better life' . He said that there is no other food sector creating more new jobs than in aquaculture and in 10 years, aquaculture will need to produce 28.8 million tonnes more per year than current annual production. In food security, in 30-40 years, this will be an issue in Europe.

In industry approaches, there is business aquaculture (mainly industrial cage culture for salmon, bass, bream, grouper, cobia, etc), which began in Japan and moved to Europe and the Americas and is based largely on monoculture systems. In Vietnam, the pangasius fish production was started mainly for export. Asia is better known for its food aquaculture, dominated by small scale enterprises with extensive and intensive production systems. China is known for its large production and integrated aquaculture.

In Asia, the transition to 'Better Life' is shown by salt farmers in Vietnam shifting into integrated salt production and Artemia production. In Asia, small producers adapt quickly to changing environments. Backyard shrimp hatcheries have moved to closed recirculation systems as the demand changed to better quality shrimp. This is 'awareness and application of good farming practices'. There is also attention on food safety and on the 'need to provide healthy and safe seafood at the correct price'. Here the need is to guarantee an equitable income for the farmers and produce affordable products. A better life requires a 'dialogue for market cooperation and mutual

From Left, Zhang Zhongqin, MSc student at SHOU, Vincent Ong Kim Leong, scientist (aquaculture) Agri-Food & Veterinary Authority of Singapore and Wang Gang, Fisheries Advance Magazine, China.

Tina Zhou (middle), organiser and past councillors of AFS; Prof Zhou Ying Qi, Shanghai Ocean University and Dr Lee Chan-Lui, Australia (right).

benefits among all stakeholders'. The My Thanh shrimp farmers Association in Vietnam has 150 members with more than 1,000 ha of production. They share ideas rather than compete amongst themselves. Sorgeloos emphasised on the need for a knowledge based approach rather than empirical farming for it to be the 'blue technology'.

Sorgeloos listed the common strategies for a 'better life'. It requires complete independence from natural stocks through domestication, improved and more cost-effective seed production, better targeted species selection and development of more efficient stocks through selective breeding. For sustainable production, it requires microbial management, better understanding of immune systems in vertebrates and invertebrates and more integrated production systems for plant and animal farming. In feeds, there should be full independence from fisheries stocks for lipid and protein ingredients.

A better life also means developing ecosystem based aquaculture in coastal and off shore farms using all the tropic levels culturing microalgae, mussels and finfish and integrating energy production (wind turbines) with food production. Aquaculture should be promoted as environmental bioremediation and habitat rehabilitation.

The conference was accompanied by a 34- booth trade exhibition. Chinese companies comprised almost half of the exhibitors and included feeds and aquaculture group, Tong Wei, feed equipment manufacturer Jiangsu Muyang, Dalian Zhangzidao Fishery group, a major seafood producer and importer and the Chuan Heng group which markets MCP for the feed sector.

The next triennial conference and trade show will be held in 2013 in Yeosu City, South Korea.

What can you expect from Aqua Culture Asia Pacific in 2012

To date, our feature articles and coverage of aquaculture in the Asia Pacific region have brought to you the issues and challenges facing the industry. This will continue in 2012 and we expect more developments as aquaculture plays its role as the leading source of seafood for the global market. In order to be sustainable, we must learn how to control diseases in shrimp and marine fish while reducing costs of production through optimization of feeds ingredients and feed management. AQUA Culture Asia Pacific can be a vital tool for your marketing needs. During this 8th year of our publication, we invite you to join us to look at opportunities and how we can help market your products and services.

Volume 8 2012						
Number	**1 - January/February**	**2 - March/April**	**3 - May/June**	**4 - July/August**	**5 - September/October**	**6 - November/December**
Issue focus *Recent developments and challenges for the next step*	Aqua feed Production	Health Management	Sustainable & Responsible Aquaculture	Food Safety & Traceability	Culture models	Hatchery & breeding technology
Industry Review *Trends and outlook, demand & supply*	Marine Shrimp	Groupers	Catfish	Marine fish (Cobia/Sea bass)	Tilapia	Freshwater Fish/Prawn
Feeds & Processing Technology *Technical contributions influencing the final value of aqua feeds*	Feed additives Processing technology	Micro-nutrients Extrusion	Product quality Feed management	Feed enzymes Good manufacturing practices	Feed probiotics Post pellet additions	Novel feed ingredients Formulation
Production Technology *Technical information and ideas*	Pond Management & Biosecurity	Biofloc /Aeration technology	Genetic Improvement	Recirculation Aquaculture Systems	Certification and Regulations	Hygiene & Food Safety
Aqua business *Feature articles*	Experiences from industry, including role models, benchmarking and opinion articles in shrimp/fish culture					
Markets	Market trends, product development and promotions at local and regional trade shows					
Show Issue *Distribution at these events as well as local and regional meetings* **Show preview in prior issues*	**FIAAP Asia, VICTAM Asia & GRAPAS Asia 2012**, February 15-17, Bangkok Thailand* **Aquaculture America 2012**, February 29 - March 2, Las Vegas	**Skretting Australasian Aquaculture 2012 (AA12)**, May 1-4, Melbourne* **8th Philippines Shrimp Congress**, May 9-11	**Vietfish 2012**, June 2012, Ho Chi Minh City, Vietnam	**AQUA 2012**, September 1-5, Prague, Czech Republic	**17th China Seafood & Fisheries Exposition 2012**, November 2012, China	

18th Annual Practical Short Course on Aquaculture Feed Extrusion, Nutrition and Feed Management

September 25-30, 2011, TAMU, Texas A&M, USA

A one-week practical short course on aquaculture feed extrusion, nutrition and feed management will be presented on September 25-30, 2011 at Texas A&M University by staff, industry representative and consultants. This program will cover information on designing new feed mills and selecting conveying, drying, grinding, conditioning and feed mixing equipment. Current practices for preparing full-fat soy meal processing; recycling fisheries by-products, raw animal products, and secondary resources; raw material, extrusion of floating, sinking, and high fat feeds; spraying and coating fats, digests and preservatives; use of encapsulated ingredients and preparation of premixes, nutritional requirements of warn water fish and shrimp, feed managements and least cost formulation are reviewed.

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

Reservations are accepted on a first-come basis. For more information, programs and application forms, contact: Dr. Mian N. Riaz, Email: mnriaz@tamu.edu Web: www.tamu.edu/extrusion

FIAAP Asia 2012, Victam Asia 2012 and GRAPAS Asia 2012

15 – 17 February 2012, Bangkok, Thailand

A larger new venue in Bangkok

Following the success of the last FIAAP, Victam and GRAPAS event in Thailand in 2010, the organisers have announced that sales for the next event are well ahead of schedule and that already well over 50% of the exhibition area has been reserved. The 2012 event and will have a similar format to that of the successful 2010 show which attracted almost 6,000 industry executives from throughout South and South East Asia. All three trade shows will be co-located within one venue which will enable visitors to view the products and technology they require in order to formulate and operate safe and economic animal feed production and grain processing facilities. This also benefits the exhibitors as the three shows attract additional visitors from related but different industry sectors to view their displays.

There is one major change to the entire event is the venue. The shows and their conferences will move to Bangkok International Trade & Exhibition Centre (BITEC). From August this year the exhibition centre will be connected directly by the skytrain.

Again there will be specific technical conferences on Aquafeed, Feed Ingredients, Petfood, Biomass Technology, Grain Processing and the Thai Feed Conferences. Further announcements on the conference series and programmes will follow shortly. Web: www.victam.com

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

2011

July 19-21
Forum on Aquaculture Innovation and Technology (FITA)
Bali, Indonesia
Web: www.rca-prpb.com
Email: publikasi@cria.indosat.net.id

August 17-18
TARS 2011 - Aquaculture Feeds and Nutrition
Singapore
Email: conference@tarsaquaculture.com
Web: www. tarsaquaculture.com

September 16-18
6th Strait (Fuzhou) Fishery Expo
Fuzhou, Fujian, China
Email: xmcdw@163.com
Web: www.fishexpo.cn

September 29-October 2
AGRI INDO – The 3rd International Exhibition on Agri Food & Dairy, Agri Livestock & Poultry, Agri Fishery & Aqua Culture
Jakarta Indonesia
Web: www.agri-indo.com
Email: info@kristamedia.com

October 18-21
Aquaculture Europe 2011
Rhodes, Greece
Email: Registration: worldaqua@aol.com
Trade: mario.stael@scarlet.be
Web: www.easonline.org

October 26-28
Aquamar Internacional IX Expo
Sonora, Mexico
Email: zoila_lopez@aquamarinternacional.com
Web: www.aquamarinternacional.com

November 1-3
16th Annual China Fisheries & Seafood Expo 2011
Qingdao, China
Email: seafoodchina@seafare.com
Web: www.chinaseafoodexpo.com

November 16-19
Third International Symposium on Cage Aquaculture in Asia
Kuala Lumpur, Malaysia
Email: caa3@asianfisheriessociety.org
Web: www.asianfisheriessociety.org/caa3/

November 21-25
Eighth Symposium on Diseases in Aquaculture
Mangalore, India
Email: kalkulishankar@gmail.com/mircen@sanchartnet.in
Web: www.daa8.org

December 8-10
SIFSE2011- 6th Shanghai International Fisheries and Seafood Expo
Shanghai, China
Web: www.sifse.com
Email: sifsecommittee@163.com

February 15 – 17, 2012
FIAAP Asia, VICTAM Asia & GRAPAS Asia 2012
Bangkok Thailand
Email: andrew.west733@ntlworld.com Web: www.victam.com

February 29 - March 2
Aquaculture America 2012
Las Vegas, Nevada
Email: worldaqua@aol.com
Web: www.was.org

2012

FIAAP Asia 2012

AQUAFEED INGREDIENTS, ADDITIVES, FORMULATION

VICTAM Asia 2012

AQUAFEED PROCESSING TECHNOLOGY

15 – 17 February 2012 · Bangkok International Trade and Exhibition Centre, Bangkok, Thailand

For everything you need for producing and packaging safe and cost-effective aquafeed

The conferences
Aquafeed Horizons Asia 2012, The FIAAP Conference 2012, Petfood Forum Asia 2012, The Thai Feed Conference 2012

Co-located with GRAPAS Asia 2012
The show for rice & flour milling, grain & noodle processing, breakfast cereal & extruded snack production

Supported by
Thailand Convention & Exhibition Bureau

BANGKOK The exhibition city of ASEAN | THAILAND convention & exhibition bureau

Further information
For additional information and **free** visitor registration visit:
www.fiaap.com or **www.victam.com**

"a partnership with synergy...your key to success"

Uni-President

CREATES THE VALUE OF PRAWN

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

CTY TNHH UNI-PRESIDENT VIỆTNAM
UNI-PRESIDENT VIETNAM CO., LTD.

Establishing a Healthy and Happy Tomorrow