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Show preview:

Trade show at World Aquaculture Bali, May 2005

Aquafeed production

Special feature:

Aquaculture in Indonesia

Microdiets for larval fish

Tilapia in China



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WRITE TO THE EDITOR

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

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Letters may be edited prior to publication

From the editor

The paradox in feeding the white shrimp

In this issue, we focus on the aquafeed production in Asia and it has come to light that there is a paradox in the feeding of vannamei shrimp in Asia. Admittedly, the culture of vannamei is changing the fortunes of farmers who were once plagued with diseases in the monodon shrimp. Both the monodon and vannamei species require different levels of protein in their diets which the feed industry has supported with appropriate specific formulations.

However, farmers culturing vannamei shrimp are using monodon feeds in their high density (stocking of 100-150/m²) culture systems. High protein diets of about 40% are being used for a species which requires less protein in order to compensate for intensity of culture. The idea behind this being that a high density culture system (and not the species) would require high protein feeds. One would question the logic behind this. Feed formulation is done to meet the nutrient requirements of a species and is hence species specific. Perhaps it is more logical to manage for intensity of culture by appropriate feeding regimes and strategies. We still have a long way to go in optimising the efficiency of culturing vannamei shrimp under such intensive conditions and appropriate feed and feeding regime may be a good place to start. Education is critical and feed companies are the key sponsors to make this change happen.

The recent development in the freshwater fish feed, albeit aided by the avian flu is an opportunity not be missed. Farmers are moving from farm made feeds to commercial feeds. This is a step forward as the freshwater fish feed market is one with large volumes and low margins. The challenge is developing feeds cheap enough to match ex farm prices. In Thailand, these challenges have been met with the use of lower cost and lower quality raw materials, according to Thomas Wilson of Thailuxe Enterprise.

Feeds for the marine fish is one segment the industry would like to see develop. Numerous companies have developed feeds for several species of groupers and marine fish and are waiting for an expansion of the market. But the dilemma is the slow uptake of commercial feeds as farmers prefer to use trash fish because of the high mortality of fish when fed dry pellets. The best way might be for feed producers to work with industry to produce weaned fingerlings. As commercial feeds are more regulated and thus traceable, should feed producers educate farmers on the future needs of traceability in their products that will be demanded by customers.

This issue has been planned for the World Aquaculture 2005 which comes to Asia in Bali. All eyes will be on Asian aquaculture, particularly that of Indonesia. In our special feature, we highlight the achievements at the Gondol Research Institute of Mariculture in the breeding of groupers and the shrimp industry in East Jawa.

We will be there at the trade show. Come and visit us at Booth 226.

Zuridah Merican
Editor

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Post tsunami Counting the costs to aquaculture

An assessment of the impact of the December 26 tsunami on aquaculture has revealed tangible and intangible damages of more than USD 500 million to Thailand's shrimp industry and USD 450 million to that in India. Tangible damages total USD 57 million to Indonesia's brackish water aquaculture industry.

In Thailand, the Department of Fisheries in their preliminary assessment has accounted losses of USD 92 million for 648,157m² of fish cages and USD 25.5 million for the shrimp hatchery sector. The Thai Shrimp Association told the Bangkok Post that some 60-70% of hatcheries along the Andaman coast of Thailand have suffered damages. These hatcheries used to supply shrimp feeder farms in other provinces such as Suratthani, Nakhon Sri Thammarat, Trat and Chantaburi. It added that the industry will require at least six months to acquire new broodstock and restore the hatcheries. The damage would cause the shrimp exports to decrease by 75,000 to 80,000 tonnes in 2005. Damages including loss of property and export opportunities is valued at USD 525 million.

In India, the Financial Express reported that data collected from Tamil Nadu, Pondicherry, Andhra Pradesh and Kerala showed damages of USD 450 million (Rs 2,000 crore). The President of the Indian Shrimp Hatcheries Association said that the southern region's aquaculture has been affected by delayed stocking. Reinvestment will be required to redo all farms and ponds that have been destroyed.

The assessment in Indonesia made by the Ministry of Marine Affairs and Fisheries and the donor agencies, though preliminary, indicated that a total of 47,957 ha of aquaculture production in 8 districts of Aceh province have been damaged. This is valued at Rp 466 billion (USD 51 million) In addition, the Regional Centre for Brackishwater Development (BBAP) in Ujung Batee – NAD, located in Aceh Besar district, is reportedly 80% destroyed. There were also 17 private shrimp hatcheries with varying scales of production, from small to medium. They were producing some 200 million postlarvae/year. They have all been heavily damaged. The cost of this is USD 5 million (www.enaca.org).

EU speeds up and gives more in GSP

In response to the tsunami disaster, the European Union has announced that the new Generalised System of Preferences (GSP) will come into effect earlier on April 1 2005, instead of July 2005. The range of tariff concessions, particularly in clothing and fishery sectors will open Euro 3 billion of trade flows for countries affected by the tsunami. In the new GSP all fishery products will benefit from tax cuts. In the case of Sri Lanka, 90% of exports will enter the EU at zero tariffs.

EU lowers shrimp tariff for Thailand

As part of the above, the EU has agreed to reduce tariffs to 4.2% for Thai shrimp exports. Currently, the tariff is 12%, the highest for frozen shrimp among regional exporters. The EU dropped Thai products from its GSP programme more than five years ago and the higher import tariff resulted in a reduction in exports to the EU. Thailand has been negotiating for lower tariffs since late 2004.

With this new tariff, exports from Thailand will enjoy the same rates as others in the region, namely, Indonesia, Malaysia, India and Vietnam. However, in the Bangkok Post, Panissuan Jamnarnwej, president of the Thai Frozen Foods Association said that as Europe demand high quality products, only exporters with cold storage facilities and close to farms could meet such a requirement. He has suggested that farmers form cooperatives and invest in cold storage facilities if they wanted to export to the EU market. (Related news: Thailand asks the EU to lower tax for its shrimp exports, *Aquaculture Asia Pacific*, Issue Nov/Dec., 2004, pp10).



Somsak Paneetatyasai

Shrimp prices up, says President of Thai Shrimp Association

Somsak Paneetatyasai, President of the Thai Shrimp Association said that increases in prices of shrimp are due to a shortage of postlarvae which is estimated at 20%. The price of postlarvae have increased to Baht 0.15/pc from Baht 0.12/pc. Following this shortage, shrimp production is expected to decline by 20-30% during the first half of the year.

During his visit to the tsunami-hit province of Pang-nga, he indicated that a majority of the hatcheries destroyed were small scale independent operators. Hardest hit were in the towns of Baan Bang-sak, Pak-weep, Baan Nam-kem, Baan Koke-gloy and Ban Bang-muang. More importantly, almost all the hatcheries in this area have not recovered.

The prices of vannamei shrimp are increasing. The highest increase was for 70 pcs/kg size which rose by 22% to Baht 130/kg (USD3.42/kg).

Average Prices of vannamei shrimp in November 2004 and February 2005 (Baht/kg)

Size (pcs/kg)	Nov. 2004	Feb. 2005	% change
50	137	157	+ 15
60	117	139	+ 19
70	107	130	+ 22

(38 baht to one USD)

Uni-President invests to speed up aquaculture in Vietnam

After the success of its aquafeed plant in Song Than Industrial Zone of Binh Duong Province, Uni-President Enterprise is increasing its investments in aquaculture with a new aquafeed factory in Tien Giang Province of the Mekong Delta. It is also applying the vertical and integrated operation mode to assist farmers in reducing risks in aquaculture

The ceremony for the contract signing of land leasing for the new factory was held on 25 January 2005 at the Legend Hotel in Ho Chi Minh City. It was presided by the Chairman of the People's Committee of Tien Giang Province, Nguyen Huu Chi and Vice Executive General Director of Uni-President Enterprise, Lo Chih Hsien.

Uni-President VN Co Ltd started production in its first aquafeed factory in July 2001. Since then, in early 2004, the production was expanded from 2,500-3,000 tpm to 5,000 tpm by adding two new lines for its shrimp feeds. The sale of feeds for both marine shrimp and fish has reached over 50,000 tonnes per year contributing to 20% of the total market share in Vietnam. It produces feeds for the black tiger *Penaeus monodon* and white shrimp *P. vannamei*. It also produces extruded floating feeds for *Pangasius* catfish and sinking feeds for grouper and cobia.

"Aquaculture in Vietnam is moving at such a vigorous pace that the present factory is unable to meet the demand for our shrimp feed. There is also the large potential in marine fish farming. Our feed, especially for our premium feed UP, LAONE, NURI brands, is highly valued and readily accepted by shrimp farmers," said Jeff Chuang Jie Cheng, Director of Aquatic Feed Division, Uni-President VN.

The total investment for this new aquafeed factory in Tien Giang Province of Mekong Delta will be USD19,520,000. It will cover a land area of 4.9 hectares. The expected capacity will be 156,000 tonnes per year of aquafeed -both fish and shrimp and production is planned to start in March 2006.

"The aquafeed sector in Vietnam is highly competitive with many international players. Thus we will also apply the vertical and integrated operation mode. We will combine a hatchery and processing plant into our aquafeed operations, similar to that adopted by the multinationals



Lo Chih Hsien (left), Representative of Administrative Board of Uni-President Enter. Corp presents the souvenir to Nguyen Huu Chi (right), Chairman of Tien Giang People's Committee during the ceremony on signing of land lease contract.



Chuang Jie Cheng (right) and Chen I Ming- Manager of Aquatic Feed Business Division, Uni-President Vietnam

in Vietnam. This is to help shrimp farmers reduce risks in shrimp culture", said Jeff Chuang.

Uni-President VN Co., Ltd will also set up an aquatic disease laboratory. The laboratory will use the expertise and technical know-how of Taiwan University together with the integrated knowledge of shrimp culture development of the Taiwan National Science Council to further develop the black tiger shrimp culture industry in Vietnam.

"Our target is to increase the market share of our aquafeed in Vietnam and then work towards the global marketing of the aquafeeds of Uni-President Enterprise", added Jeff Chuang.

Indonesia removes ban on shrimp imports

On January 28 after a dialog with all stakeholders in Indonesia's shrimp culture industry, the Minister of Marine Affairs and Fisheries agreed to revoke an earlier ban on all shrimp imports into Indonesia.

In 2004, the government had announced a six-month ban on shrimp imports from all countries starting December 28. It said that the move was made to protect the local industry and consumers from a suspected contamination from imported seafood. However, this also affected imports of vannamei shrimp broodstock. Some 80% of marine shrimp cultured is vannamei and these depend on postlarvae produced using imported broodstock.

The statement in Kompas said that following the ban, the processing industry suffered from a shortage of materials. Processors than indicated that several may be forced to close. The sector comprises 287 small and large units with 60% involved in shrimp industry. It employs 358,306 workers. With the removal of the ban, shrimp importers agreed

that imports will be used for value adding processing and for re export only. Imported shrimp will not enter the domestic market.

In the same statement, data released from the Department of Marine Affairs and Fisheries indicated that shrimp exports totalled 137,636 tonnes with a value of USD 850.2 million in 2003. In 2004, this is expected to increase to USD 1.08 billion from 143,550 tonnes of exports. In 2005, the target is USD1.1 billion. Production volumes from aquaculture were 159,597 tonnes in 2002, 192,912 tonnes in 2003 and 242,560 tonnes in 2004. In 2005, the target production is 300,000 tonnes. (Related news- Indonesia: six month ban on shrimp imports, Vol. 1(1), 2005 pp 12).

Thailuxe expands fish feed production

Thailand's Thailuxe Enterprises, will be expanding its fish feeds production to meet the increasing demand in the country. The company has invested Baht 170 million (USD 4.4 million) in a new top-of-the-line fish feed factory that is expected to start production in May 2005.

"Initially, our production capacity for fish feed will double to 72,000 tpy. We will be able to expand capacity further when needed", said Thomas Wilson, Vice President. "The current capacity is 36,000 tpy".

The company is a major feed company in Thailand with 11 years in producing fish feeds and 17 years in the production of shrimp feeds. Currently, its range of feeds includes feeds for the catfish and climbing perch, tilapia and feed for herbivorous fish. It also produces several ranges of feed for the marine shrimp.

"Thailuxe seeks to produce the best quality feeds with the highest performance in each market segment. We are usually slightly higher-priced than other feed companies, but our customers are more than compensated by better profitability. Thailuxe has 90% of the market for feeds being used to grow climbing perch, mainly because our feeds have feed conversion ratios lower by 0.2-

0.3 than feeds from other companies. The total cost of production when farmers use Thailuxe feeds for climbing perch is about 50% of sales revenue, ensuring above average profitability", said Thomas.

"The goal for shrimp feeds is to keep increasing sales (up 84% in 2003, up 23% in 2004) by focusing on the production of quality feeds that exceed our customer's expectations. Last year was a very difficult year for shrimp feed, since all companies had substantial rises in raw materials costs, but was only able to raise the selling price slightly. We feel it was a worthwhile investment in customer goodwill and strengthening the image of our company in the shrimp industry. This should translate into above average sales gains this year".

The company has recently introduced a water stable extruded feed for crabs. This is the first step in a series of new product launches this year.

New EU guidelines on the traceability of food products

End January, the European Union issued specific guidelines for its member states on the traceability of food products, withdrawal of dangerous food products from the market, operator responsibilities and requirements applicable to imports and exports. This is their drive towards complete supply chain traceability.

The new mandatory traceability requirement applies to all food, feed, food-producing animals and all types of food chain operators from the farming sector to processing, transport, storage, distribution and retail to the consumer. The guidance document lays down detailed implementing rules for operators.

Information on the name, address of producer, nature of products and date of transaction must be systematically registered within each operator's traceability system. This information must be kept for a period of five years and on request, it must immediately be made available to the competent authorities.

In the fragmented aquaculture industry in Asia, fish and shrimp purchasers revert to feed producers to ensure the traceability aspects of the feed and that it complies with import requirements of the importing countries. This also includes the use of genetically

modified organisms (GMOs) which has to be avoided through the knowledge on the source of raw materials.

Not only will the industry need to conform to the EU guidelines but also to requirements in regional markets. An example was the recent scare with formaldehyde contamination in shrimp imported into Singapore which was allegedly attributed to traces in feeds. (This was later disproved). In the Philippines, efforts are underway by the government and industry to institutionalize traceability after it was discovered that imported shrimp laden with antibiotics were being re-exported, according to Philip Cruz. It is at a preliminary stage but a certification process for best aquaculture practices are being developed to be in place in early 2006. Fully integrated aquaculture businesses with farm, feeds, hatchery and processing plant can expect to implement this sooner.

India and Thailand seeks CCR on tariffs

In the wake of the tsunami disaster and its impact of the farmed and capture shrimp industries of India and Thailand, both countries are seeking a changed circumstances review (CCR) in the US shrimp antidumping action. Although the US International Trade Commission (ITC) announced on January 26 that it will make a review of the situation in India and Thailand, the two countries will seek a CCR. This means that the countries would need to demonstrate the impact of the tsunami on overall shrimp production, export capacity and the long term reduction in production. For this, there has to be credible pre-tsunami baselines, according to the report in the Financial Express.

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White hope in South Thailand

by Ng Chee Kiat



A shrimp farm situated along the banks of the Songkhla lake. This renewed interest in shrimp farming is due to the successful introduction of *P. vannamei*



Threats of disease like symptoms of the dreaded SEMBV do not deter shrimp farmers from growing the *P. vannamei* owing to the lucrative incomes

When costs of production no longer made the black tiger a viable option for farming, farmers around Songkhla lake in Southern Thailand slowly switched over to farming the white shrimp. Farmers are smiling again with lower costs and higher margins.

The communities fringing Songkhla Lake in South Thailand have traditionally been dependant on natural fishery resources from the lake. However, when Thailand adopted shrimp farming, many new ponds were dug up along the banks of the large lake. For many years, the main choice was the farming of the black tiger prawn, *Penaeus monodon*, also known as "Kung Kula Dam".

As the shrimp farming industry progressed and the level of intensification increased, crop failures appeared with increasing regularity. This progressed to a point where costs of production no longer made the black tiger a viable option for culture. By June 2004, some 40% of shrimp farmers had abandoned their ponds as black tiger prawn farming was not lucrative enough. This situation was aggravated by the slump in international prices for shrimp.



Oxygen demand is critical for the successful farming of the white shrimp in Thailand. As many as 18 units of long arm aerators like the one shown here may be required in ponds with biomass of 6 tonnes

Introduction of the White shrimp is making farmers like this smile again with lower costs and higher margins.

Meanwhile, some large companies with support from the Department of Fisheries ventured into the farming of the White shrimp, *Penaeus vannamei* known locally as “Kung Khau” which literally means “White Shrimp”. Initial problems ranging from production technology, costs and disease concerns to market demand, bio-security and sustainability of the industry were quickly overcome. Slowly, farmers were switching over to this “Great White Hope” which could be produced at much lower costs and seemingly had higher levels of tolerance resulting in survival rates of more than 90%.



By January 2005, during my last visit, the situation has changed. Farmers now stock between 500,000 to 750,000 postlarvae per pond of 4 rai (6,600m²) which equates to a density of 75 to 115 pl/m². This was easily three times what they could manage for the black tiger. Most importantly, the farmers are now farming with minimal use of chemicals and additives, apart from lime and EM* for the ponds. Production was extremely high as a result of the good survival rates with yields of 6 tonnes per pond (4 rai) which translates to 9 tonnes/ha.

Thus, it is no surprise that more and more shrimp farms are being revived in Thailand. Forecasts from industry players suggest that farmed shrimp production in Thailand will reach a record high of 600,000 tonnes in 2005. Of this, almost 80% or 500,000 tonnes will be *P. vannamei*. This will auger well for shrimp feedmills in Thailand, faced with fluctuating demand during the last few years. They can perhaps look forward to producing increasing to 90% of their production capacity from now on.

Farmers used feeds formulated for the *P. vannamei* with a lower protein content (35%) as compared to those for *P. monodon*. These feeds also cost 25% less. But feed conversion ratios can range from 1.2 to 1.8 with *P. vannamei*. Those that use feeds formulated for the black tiger can achieve better feed conversion ratios of 1.0 to 1.2.

*EM or Essential Microbes is a probiotics widely used in Thailand. It was supposedly developed by a Japanese researcher using beneficial soil bacteria and has lately been incubated and modified by PSU (Prince of Songkhla University) for shrimp farms in South Thailand.

Most of the farmers could grow the shrimp to a size of 70-80 pcs/kg within 90 days and their cost of production was estimated to be between Baht 75 to 85/kg (USD 1.9 to 2.2/kg). Shrimp were sold at prices of Baht 95 – 110/kg (USD 2.4 to 2.8/kg). Prices for larger shrimp were significantly higher with 25g shrimp fetching Baht 240/kg (USD 6.2/kg) whilst the production cost was less than Baht 120/kg(USD 3.0/kg)

The problem was that only good quality postlarvae could attain sizes of 40 pcs/kg, after an additional 30 days. This meant that with another month, farmers may expect an increase in profit margins of almost 100% with quality postlarvae.

Ng Chee Kiat has 18 years of experience in Asian aquaculture, of which 10 years were in aquafeed operations. His experience covers planning and design, sales and marketing and project management. Currently he is Managing Director of Inter Sea Fishery (M) Sdn Bhd. Chee Kiat is also the current President of the Malaysia Fisheries Society. Email: intersea@maxis.net.my



Years of lost opportunities for Philippine fry producers

By Philip Cruz *

Fish and shrimp fry producers in the Philippines are losing millions of pesos in potential revenues because of the government's long standing ban on exports of fry.

In the early 80s, when postlarvae prices in other countries were much higher than in the Philippines, an export ban was imposed. This was to ensure sufficient supply to local black tiger shrimp producers in the Philippines. However, in the early 90s with the closure of many farms, there was an oversupply of postlarvae in the country. The ban was then no longer necessary but somehow, the group that had early campaigned for this ban did not work for its removal.

Since the early 90s, many hatchery operators in the country have had years of lost opportunities to export. At present, the Philippine shrimp hatchery industry operates at only around 20% of its capacity as this is what the local shrimp farmers can only absorb.

A similar situation also exists with the export of milkfish fry. Local fry producers have excess capacity at certain months of the year but they cannot export because of a similar ban. In contrast, milkfish fry from Indonesia can be freely imported into the country at any time of the year. In 2004, the country imported over a billion fry mainly from Indonesia. Recently, orders for a local hatchery from an importer in the Middle East were diverted to Bali.



Packing for export of milkfish and groupers from this hatchery in Bali

This self-inflicted "trade barrier" does not end here. Even the tilapia industry cannot export fry. But for some strange reason, it can export fingerlings. Clearly, something is fundamentally wrong with Philippine import/export regulations for seedstock. It does not come as a surprise that foreign genetics companies have stayed away from the country despite its ideal geographic location as an export base.

Also, as a consequence of the lack of employment opportunities

in the hatchery sector, many of the skilled Filipino hatchery technicians are now working overseas mainly in Iran, UAE, India, Madagascar and other Asean nations.

With the possible legalisation of white shrimp farming in the Philippines within the coming months, there is renewed interest from the hatchery industry to tap the export market. Two new industry organizations, the Philippine fry federation and the fisheries and aquaculture board of the Philippines are already looking into the export problem which will require the approval of the Philippine Congress.

* Philip Cruz, Cruz Corporation email: cruzcorp@mozcom.com

Investing in processing capacity in Vietnam

Seafood processors in the south of Vietnam are investing to increase their competitiveness globally. A report of the Vietnam Economy said that the Minh Phu Seafood Import and Export Corporation in Camau province has invested USD 2 million in a new plant with a designed capacity of 5,000 tonnes/year. An Giang Aflix Company in the Mekong has begun operating a 2,000 tonnes/year plant built at a cost of USD 1.27 million. Cataco also plans to invest USD 3.3 million to increase capacity of its plant in Tra Noc to 12,000 tonnes/year in 2005.

Caviar from China

A company farming sturgeon below the Three Gorges Dam has announced plans to sell sturgeon eggs. The target is 60 tonnes per year, according to the Tianxa Sturgeon Company. Their partner is Caviar Creator, an American company. Currently, the main producers of caviar are Russia and Iran and China sells small quantities from the river Amur. (News.telegraph).

Thailand promotes industrial catfish farming

Thailand will expand commercial culture of Pangasius catfish due to demand from overseas markets and the attractive prices. Yuthasak Supasort of the National Food Institute said in a report in the Bangkok Post. He expects that exports of catfish will earn 10 billion baht per year (USD 263 million). Catfish are currently farmed in the Mukdahan and Ubon Ratchathani Provinces near the Mekong river.

More farmed cod in the market soon

Nutreco Aquaculture which produces about 20% of the world's salmon plans to expand its cod farming operations. According to a report in the Star, production can reach 700,000 tonnes by 2015. Stocks of wild cod have been declining and currently average one million tonnes. Demand remains strong for the cod, one of Europe and America's favourite fish.

Research into cod farming was started in the 1980s and in 2002, the company bought a stake in Cod Culture Norway and set up a cod hatchery with a capacity of 10 million fry. Researchers at Nutreco have overcome the initial difficulties in nurturing larvae. With the discovery of the nutritional requirements for the species, they expect that farming cod will be similar to the salmon which the company already has an edge.

Black tiger shrimp technology for Vietnam

INVE the Belgian group has proposed the setting up of a joint venture in Vietnam to transfer the technology on the rearing of high yielding and disease resistant black tiger shrimp. Moana, a subsidiary of INVE and located in Hawaii, US will offer shrimp larvae as well as transfer advanced technology to Vietnamese counterparts. The nursing of the larvae will be carried out in Vietnam. This was discussed between the Minister of Fisheries and INVE president Flor Indigne in Hanoi recently, according to Thanhnien News.



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Nurturing industry by Zuridah Merican

The shrimp feed market is expanding mainly due to white shrimp culture. To gain a competitive edge, feed producers are increasing the scope of technical and laboratory services and moving upstream to supply disease free or resistant postlarvae. A higher consumption of farmed freshwater fish due to the avian flu in Vietnam, China and Thailand is creating demand for fish feeds. Newcomers include livestock feed and shrimp feed producers.

Aquafeed production continued on its upward trend in 2004. Based on estimates from the industry and correlated with production volumes, shrimp feed demand in 2004 was around 1.2 million tonnes for Thailand, Indonesia, Vietnam, India, Malaysia and the Philippines. Increases were attributed mainly to the intensive culture of the white shrimp in Indonesia and Thailand. Compared to estimates made for 2003, feed demand increased more than 30% in both countries. Fish feed production, particularly in Vietnam and Thailand increased mainly due to the demand for catfish and tilapia feeds. Industry has estimated that the demand for freshwater fish feeds was 1.08 million tonnes for these countries in 2004.

Shrimp feeds

From mid 2003 to most of 2004, feed producers said they were disturbed by the uncertainty on the quantum of tariffs to be imposed on shrimp exports under the US antidumping petition. Although four Asian countries—China, Thailand, India and Vietnam were named, there were ramifications for others. Intraregional movements of white shrimp at competitive prices into Malaysia and Indonesia to supply processing plants threatened the survival of local shrimp culture operations. Indonesian authorities acted with a total ban on imports but this was quickly lifted (see page 5). It was the role of the feed industry to mediate between the proponents, the cold storage operators and opponents, the shrimp farmers.

Although shrimp prices are slowly moving upwards, farmers realise that it will not reach the previous highs. Thus they have remained price sensitive on the purchase of feeds, according to a major feed producer. Longer credit terms and price, in this order, are now the determining factors in their choice of feeds. In 2004, feed producers also faced rises in raw material costs, especially for soybean and fish meal. In mid 2003, they also faced a continuous increase in freight costs. Some passed these increases to farmers whilst others absorbed them. A producer in Thailand said that manufacturing costs rose by 30% whilst in the Philippines, an abrupt increase in raw material prices in 2004, particularly of fish meal and soybean meal resulted in at least 10% increases in feed prices (Phillip Cruz, pers. comm.). Thus a continued pressure on margins persisted during the year.

Shrimp feed production is still dependent on imported raw materials (60-70%) with fish meal, mainly from Chile and Peru being the main ingredients. In the Philippines, 90% of raw materials are imported for shrimp feed. In mid 2004, a shortage of fish meal with less than 65% crude protein, required for fish feeds was reported in Thailand. Fish meal with more than 65% crude protein is available in Vietnam. Squid liver protein, imported from Peru and Japan is used in China. Sources for soybean meal are from US, Argentina, Brazil, Thailand and India. Industry said that there have been no significant moves to reduce the animal meal components with plant meals in shrimp feed.

A paradox with vannamei shrimp

The vannamei shrimp, less cannibalistic relative to the black tiger shrimp, has lower requirements for protein. However, with the intensive



Groupers feeds used for cage culture in Bali

culture conditions in Asia, feed demands have become entirely different. Feed companies continue to market dense feeds (crude protein from 38 to 42%) formulated based on the requirements for the black tiger shrimp. They also market feeds for the vannamei shrimp (maximum crude protein of 35%). But out in the field, there is no species differentiation with feeds and the choice by the farmer is now based on stocking densities, financial capabilities and ultimate target in terms of days of culture to reach a specific harvest size.

Feed costs depend on the days of culture and stocking density. To achieve larger sizes at harvest (50 to 60pcs/kg), the farmer may choose to use black tiger shrimp feeds for his intensive culture (>150/m²) as the price difference between this feed and that of the premium vannamei feed (35%) may be only 6% but the FCR can differ from 1.2 to 1.4. Even if farmers use the lower (30% crude protein) and target lower sizes (70/kg), some say that it is still not economical for them to use these lower crude protein feeds as the FCR can increase to 1.7. Similarly, in China, farmers using intensive culture systems prefer high protein diets as the price variation between feeds for the black tiger and vannamei shrimp may be only USD 10/tonne.

These high density culture models equal higher feed demands. As the culture period is extended to more than 120 days, FCR increased and thus more feed is required for each cycle. In the eastern part of Indonesia, the general trend is for stocking rates of 150-200/m², according to Arianto of PT Suri Tani Pemuka's Banyuwangi factory.

Local and regional markets

Despite uncertainties with shrimp prices and threats of tariffs, investment carries on. A feed company in India indicated that they will increase

Industry estimates on feed production in 2004 and projections of demand in 2005 and 2006

	Demand		Growth in 2006
	2004	2005	
THAILAND			
Shrimp	530,000	530,000	+15
Freshwater fish 1	300,000	360,000	+15
Freshwater prawn 2	2,500	3,000	+15
INDONESIA			
Shrimp	200,000	210,000	+5
Freshwater fish	350,000	380,000	+10
INDIA			
Shrimp 3	150,000	170,000	+15
Freshwater prawn 4	60,000	80,000	+15
VIETNAM			
Shrimp 5	250,000	260,000	+4
Freshwater fish 6	250,000	300,000	+20
PHILIPPINES			
Shrimp 7	15,000	15,000	-5
Freshwater fish	150,000	150,000	10
Marine fish & Milkfish	100,000	100,000	-5
MALAYSIA			
Shrimp	27,000	28,000	+5
Freshwater fish	32,000	32,000	-

*1 & 2 excl. farm made feeds 100,000 tonnes and 2. 5,000 tonnes, respectively.
3. excl 10,000 imported feeds, 4. excl. 40,000 tonnes of farm made feeds,
5. excl. 30,000 tonnes imported feeds, 6. excl. 100,000 tonnes of farm made feeds and 7. production of 30,000 tonnes of shrimp.*

capacity by 25%. But expansion is most apparent in Vietnam where the government is pushing for higher production volumes through the adoption of better culture technology. The country's capacity currently is estimated at 250,000 tpy in 2004. Uni-President Vietnam, a leading player in shrimp feed production expanded to 5,000 tpm in 2004 and will further expand with a new feed mill in the Mekong Delta (see page 5).

As the next step, some national companies are expanding to regional markets. In China, Sanfeng & Sanfulin Group expanded capacity by 75% to 36,000 tpy with a new shrimp feed plant in April 2004. The company which produces both aquafeeds and livestock feed shifted towards shrimp feed production as the demand for livestock feeds had declined drastically. Thai Union Feed Mill, which produces the Profeed brand expanded shrimp feed capacity to 200,000 tpy to gain market share in Thailand and the region. In 2003, it linked with Avanti Feeds for local production in India. In 2003, Inteqc Feeds expanded capacity to 7,000 tpm of shrimp feeds and is increasing market share in export markets such as Malaysia and Vietnam. (Buranakanonda, 2003).

Bundling more services

The tools of keeping customers satisfied are becoming competitive too. Currently, it has become a norm for large players to gain market share by supplying specific pathogen free or resistant *P. vannamei* postlarvae. Diagnosis of diseases in postlarvae for both species and supply of good quality seedstock for *P. monodon* is also expanding.

The local production of SPF/SPR postlarvae using imported broodstock was initiated by Charoen Pokphand Foods Ltd (CPF) in Thailand in 2001. This was then extended to customers in Indonesia and supply is currently by hatcheries in Lampung and Medan. CPF is also leading with collaborative work with researchers on the domestication of *P. monodon* in Thailand. This year, PT Suri Tani Pemuka, a fully integrated feed producer in Indonesia will set up a hatchery in Bali.

What they say



The real cost of cheap feeds

In the interest of reducing production costs, farmers ask for cheaper feeds. This is a demand that a feed producer must meet to be competitive. However, some companies market feeds with very low prices, which not only drive margins down for all producers, but feed quality is being sacrificed in lieu of market share. Thomas Wilson, of Thailuxe Enterprises PCL said, "This actually is not in the best interest of the farmer".

"The farmers believe that they are saving money, but in fact their total feeds costs rise as feed performance decreases. In Thailand, the cheaper feeds are actually only 1.5 -2 baht lower than the next higher grade but the FCR obtained will be 1.4 instead of 1.2, and fish will grow slower. Ultimately, actual cost of production per tonne of fish will be higher than with better feeds. It will be the smaller farms that may not realise this, rather than larger ones".

"Flesh quality of fish and shelf life is also affected. We are in fact wasting our customer's resources by increasing his feed costs, reducing the water quality in his farm. We are also increasing the likelihood that our customers will not be so successful, and will not achieve a better life for their families and communities".

More technological inputs

Although the shrimp feed market in the Philippines may expand from the current 15,000 tpy with the introduction of the vanamei shrimp, Christopher Co of Overseas Feed Co Ltd said, "Ultimately, the sustainability of the industry will require a radical change in the way we culture shrimp in the Philippines. This means, higher densities, more artificial inputs, smaller sized farms, better government support, better farm and "farm to market" infrastructure, better technology utilization especially in sustainability through pollution and disease control. This is regardless if it is monodon or vannamei. Once these are addressed, volumes will surely go up".



Creating markets and moving to the next level for fish feeds in Indonesia



Often the authorities have called for a shift to a higher level of technology so that Indonesian fish farmers can increase productivity levels. P. Hidayat of PT Suri Tani Pemuka (STP), a large fully integrated feed producer, said that this has become a challenge for feed producers.

"As a major stakeholder, STP would like to see an expansion of the marine aquaculture industry. We have supported development in the culture of the high value grouper with commercial feeds".

"The largest farmed fish is the carp and production continues to be threatened by the KHV. Lake Cirata alone requires 7,500 tonnes per month. As the KHV has affected small carp farms and backyard hatcheries, it is difficult to stop the culture to prevent the spread of the virus. It is also difficult to convert farms to culture tilapia or other species as the ADG of carp is much higher. There is no processing as fish are sold live at 300g. We need to find solutions to this problem".

"We would like to see the development of industrial aquaculture for species such as the carp, tilapia, and Pangasius catfish. This is similar to some of the industrial scale tilapia culture that we have where the products are marketed internationally. When the carp and catfish aquaculture reach these levels and have a higher commercial value, then it creates markets for aquafeed producers".

As this is becoming a requirement for shrimp feed producers in the region, other companies have forged alliances with producers of quality postlarvae. In 2004, Lab Inter of Thailand teamed with a group of local hatchery operators to supply postlarvae to their clients. Thai Union also assists farmers with the supply of disease resistant postlarvae. Many others have similar plans and it is predicted that this trend will move on to other countries when *P. vannamei* culture starts.

Another feature is the post harvest marketing and handling of harvested shrimp which farmers are beginning to rely upon. In 2004, Malaysian feed companies, Aquaculture Asia and Grobest, set up cold storage facilities for clients. Today, the list of services includes advice in feed management, field visits, water quality tests, disease diagnosis and laboratory tests for postlarvae. Some provide disease analysis by PCR analysis and newsletters. India's Waterbase Limited has an alliance with Inve, to provide health products and services.

Fish feeds

Demand for cheap feeds

The avian flu in Vietnam and Thailand has increased the demand for fish. Prices of farmed catfish and tilapia rose 6-10 baht/kg relative to 2003 and this stimulated new aquaculture production (Thomas Wilson pers comm.). However, the demand is for low cost feeds which Thai companies produce by increasing amounts of plant protein meals, animal and poultry by products. The cheap feeds would substitute farm made feeds which use chicken entrails from the poultry processing. With the avian flu epidemic, these were in short supply. Livestock feed producers also started to diversify into fish feed production using low pelleting technology to produce high volumes/low price feeds.

In Vietnam, the demand for commercial fish feeds is increasing as catfish production is expanding. Fish volumes expanded from 200,000 tonnes to 300,000 tonnes in 2004 and in consequence, the processing industry has expanded to meet the volumes. However, on farm made feeds is still significant at 100,000 tonnes against 250,000 tonnes of commercial feeds.

Expansion

To meet this new demand for fish feeds in Thailand, Thailuxe Enterprises which recorded higher fish feed sales compared with 2003, will expand capacity in 2005 (see page 6). Early this year, Betagro also announced that it would increase capacity of its fish feed production from 1,500 tpm to 6,000 tpm with a new plant. In addition, shrimp feed producers in Thailand, unsure of the future of shrimp exports and suffering from low profit margins also converted shrimp feed lines to fish feed production.



Feeds for vannamei shrimp. Photo courtesy of Ng Chee Kiat.

An expansion of fish feed production capacity to more than 150,000 tpy is already underway in Vietnam. In November 2004, Minh Quan Co doubled output with a second feed mill producing extruded floating feeds. Viet Thang Aqua Feed Stock Joint Company also plans to expand to 70,000 tpy to meet the demand for fish feeds. At present it produces 30,000 tpy of floating feeds. Several other companies such as CJ Vina Agri, Ocialis and Cataco already increasing production (VN economy news, 2005)

In Indonesia, feed volumes have been estimated at 350,000 tonnes in 2004, according to Candra Yanuartin, of PT Sinta Prima Feedmill, the largest fish feed producer. This is despite problems with Koi Herpes Virus (KHV) in carp culture and restrictions in aquaculture in open

Prices in 2004 and examples of specifications in shrimp feeds in 2004

Country	Feed type	Local prices		Feed specifications				
		kg of feed	change*	prestarter %CP	starter %CP	Grower %CP	Finisher %CP	%CF
Thailand	BT (M)	37-31	↑	38	38	38	38	6
	WS (P/L)	35/20	↑	38/35	38/35	38/35	38/35	5
Indonesia	BT (P/M)	Rp 9,5000/7,5000	↑	40/39	40/39	39-38/38-37	37/36	6
	WS	Rp 6,300-6,500	↑	30	30	30	30	30
India	BT (P)	Rs 40-42	↑	41	41	41-40	40	5-6
	BT (P)	Rs 50-30		-	43	42	41	4-6.5
Vietnam	BT (P)	VND 16,500	↑	-	42	40	39	7
China	BT (P)	USD 0.61-0.65	↑	-	42	40	38	3.5
Malaysia	BT (P/M)	RM 3.70/3.30		45-40/38	44-42/38	41-37/38	40-36/38	5-8
Philippines	BT	Peso 48	↑	45	42	40	38	6

BT (P/M)= Black tiger shrimp, premium/medium WS (P/L)= White shrimp premium/low Conversion to one USD, Thai Baht-38, Peso-55, RP- 9,200, RM-3.80, Rs-44, VND-15,700 *price change since 2003

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Prices in 2004 and examples of specifications in fish and freshwater prawn feeds in 2004

Country	Local prices	Feed specifications				
	kg of feed	Change*	starter	Grower	Finisher	%CF
Freshwater prawn						
Thailand	Baht 21		35-42	32-35	25-32	4-6
Indonesia	Rp 5,000	↑	30	30	30	5
India	Rs 17-23		35	31	31	4
	Rs 20-32		43-25	42-30	na	6-3
Vietnam	VND 5,000		35	30	30	
Malaysia	RM 1.20-2.00	↑	32-35	30	30	3
Freshwater fish						
Thailand	Baht 16-18		32-45	32-45	25-40	5-12
Indonesia	Rp 3,250-2,800		30	28	28	6
Vietnam	VND 5,000		40	25	20	5-6
China	na		30	28	26	-
Malaysia	RM1.85	↑	30-34	25-30	20	3-6
Philippines	Peso 20	↑	30-34	25-30	20	3-6
Marine fish						
Philippines	na		46-48	44	42	10-14
Vietnam	na		47	45	45	10-12
Indonesia	Rp10,000		45-50	45-50	45-50	9

Conversion to one USD, Thai Baht-38, Peso-55, RP- 9,200, RM-3.80, Rs-44, VND-15,700, *price change since 2003

water bodies. Carp contributes 125,000 tonnes to the annual fish production of Indonesia. She added that the company will work with the government to solve problems caused by feed effluents in large lakes, in particular Lake Cirata, to ensure that cage culture remains sustainable. PT Sinta will also expand to produce floating feeds to keep up with competition and provide more choices to the farmer. It will also integrate seed production into its feed production activities.

Outlook in 2005

Shrimp feeds

Industry has indicated several driving factors that will determine the direction of shrimp feed production. An increase in feed volumes will be through developments in the culture of vannamei shrimp which in turn is determined by the availability of good quality postlarvae. The late start up due to the damage from the recent tsunami will also affect feed demand in India and Thailand.

Overall, it will be the global competition in shrimp production and the impact of exports, mainly from China that will reshape the industry in the region. Will the 'China – factory to the world' syndrome continue to affect the shrimp industry as well? Apart from cost of production, the competitiveness of shrimp farming in any particular country is affected by tariffs and regulations imposed by importing countries. Currently, China, India, Vietnam and Thailand are subjected to varying US antidumping tariffs and Malaysia, Indonesia, India, Vietnam and Thailand will have an equal import tariff into the EU for frozen shrimp from April 1, 2005. Any change in tariffs will effectively change their relative positions on the competitive ladder. The feed industry is affected when local production declines following imports of shrimp from a

neighbouring country and are reprocessed for export. This occurs when punitive tariffs are levied on specific countries. The impact will be greater for high cost producers such as the Philippines, Malaysia and Australia.

Fish feeds

Industry has indicated growth of up to 20% in feed volumes for freshwater fish culture. However, nearly a third of the feed demand in Vietnam and 25% in Thailand are met by on farm made feeds. A significant shift to the use of commercial feeds will depend on how feed companies match prices of feed to the ex-farm prices of fish. Industry sources say

that a similar situation exists in Malaysia where commercial feed usage is only 37% of demand. In India, farm made feeds comprise more than 60% of the demand of feeds for the freshwater prawn.

The culture of marine fish is expanding in the region with the availability of hatchery reared fingerlings. Many commercial feeds are available but its usage is constrained by farmers' preference for trash fish or on farm made feeds. This is due to the high mortality rate during weaning and exacerbated by trash fish availability from nearby fishermen. Feed companies in Indonesia are working with researchers to produce fingerlings weaned on dry feeds to reduce the mortality impact. The lack of a domestic market for marine fish other than milkfish poses a volume constraint faced by marine fish feed producers in the Philippines. Waiting for critical mass may be slow as efforts to reshape consumer preferences towards marine fish is challenged by purchasing power.

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References and further reading

- Buranakanonda, A., 2003. Thailand Inteqc Feed vies for bigger market share. *Asian Aquaculture*, May/June 2003. pp 24-25
 Merican, Z. and Ridmontri, C., 2003. Pressure for lower costs and better quality feeds. *Asian Aquaculture*, May/June 2003. pp12-15/26.
 VN economy news, 2005; <http://www.vnemart.com.vn>
 Tacan, A.J., 2004. Estimated major finfish and crustacean aquafeed markets: 2000 to 2003. *International Aquafeed*, Volume 7 (4).

Beyond selling feeds

In Central Visayas, Philippines aquafeed producer Oversea Feed Co Ltd provides additional services for its customers, ranging from forecasting farm gate prices to personal supervision of harvest, and canvassing and procurement of other farm supplies. This is an example of the changing role of a feed company in the region's aquaculture industry.

"This is the difference from our approach in the early 1990s. Today, it is beyond selling feeds to that of total support." said Christopher Co, Managing Director of Oversea Feed Co Ltd (OFC) based in Cebu City.

Oversea Feed Company (OFC) used to work through dealers to sell its feeds. When faced with bad debts as black tiger shrimp farmers encountered poor harvests due to a range of diseases caused by luminous bacteria, water pollution, and white spot virus syndrome (WSSV) infections, it then decided to work directly with farmers. In this way, it is able to lower feed prices, have a larger role in the farm operations and help the farmer all the way. This benefits both parties.

"It helps that we are integrated with a hatchery and grow out ponds. Farmers do not take our advice just as sales talk because we can talk to them from a hatchery, grower, or feedmill's point of view", said Chris Co. "We have annual meetings with farmers to forge close relationships and they do not shift their loyalty. This is our biggest strength".

District Technical Assistants (DTM) from OFC visit farms termed as "delicate accounts" three times a week whereas once a month, they concentrate on handling problematic farms although the DTMs are mandated to visit all the accounts as much as possible. In turn, OFC's consultant, Prof Valeriano L Corre, Jr from the University of the Philippines, Visayas continuously updates the DTMs on the latest farming techniques either through regular field visits to various growing



Christopher Co (left) is also the vice president for Visayas of the PHILSHRIMP - Philippine Shrimp Industry Inc. a group of producers for the sustainable development of the shrimp farming industry in the region. On the right is Roberto A. Gatuslao.

prawn growing areas of the Philippines and through OFC's own aquaculture farm which serves as their R&D facility at the same time.

As there is now a necessity to conduct regular monitoring of water quality in reservoir and culture ponds and to conduct regular health checks on shrimp, OFC is encouraging farms to set simple laboratory facilities. They offer training with free board and lodging followed by assistance to select suitable equipment as well as technical staff to run the laboratories. To date, the company has helped more than 20 farms. There is also a chain effect as the success of some farms has pushed others to set up similar facilities.

This new capability of farms to carry out in house monitoring has resulted in considerable cost savings. However, farmers still do need to use the PCR –polymerase chain reaction machines at government laboratories for WSSV detection. These cost Peso 700 (USD 12.8) for each test. Some farmers use the "Shrimple" test kits which then costs less at Peso 550-600 (USD 10-11) per test.

OFC is well established in Cebu with all of its production facilities located here. It has a feed plant at San Fernando producing feeds for the milkfish, tilapia, and other finfish species and the marine shrimp. Some 60% of production is feed for the black tiger shrimp. OFC started a shrimp farm and hatchery in 1987 and then moved into feed production at the end of 1988.

The marine shrimp and fish hatchery is located in Bacay. Milkfish fingerlings of more than one cm are sold to farmers. The hatchery is equipped with 30 ten tonne tanks for rotifer culture and larval rearing as well as a new egg washing equipment for the marine shrimp that has proven to be effective in removing virus, especially WSSV, from the eggshell or cyst. This plus a new procedure has allowed the hatchery to produce "organic" prawn fry, a prawn fry that did not directly use any antibiotics or chemicals in its production. The company now lacks a processing plant to be fully integrated. However, Chris Co is of the opinion that this is an entirely different industry and OFC is not ready for this for the moment.



Pond bottom after treatment with probiotics. Prof Valeriano L Corre, Jr (right) is also the "father of greenwater technology" adopted by most farmers in the region. He also developed the protocols for pond cleaning with probiotics.





These 1 m² survival nets hold 200 postlarvae. Survival rates are checked 3,7,15 days after stocking. This allows the owner an initial basis to determine if the stock can be continued or stopped due to low survival and poor performance.

In late 2003, the company started to develop feeds for the cobia, seabass, pomfret, crab and grouper. Cobia feeds were tested in farms in General Santos, Southern Mindanao, although it is with seabass and pomfret that has made better inroads in the Philippine feed market. Chris Co said that aside from milkfish and tilapia, the domestic market is small for other marine fish species. "The idea is to get local consumers to shift from meat to marine fish".

Aquafeed production in the Philippines has been plagued by high raw material prices. There is no large local industry for any of the raw materials used in shrimp and fish feeds production, although local fishmeal could possibly be used in feeds for fish and the vannamei shrimp. In comparison to the industry in other countries, Filipino feed producers face high freight and internal costs.

The outlook on shrimp farming in the Philippines remains bearish in the Philippines despite the keenness of the government to revive the industry to its former glory. The Philippines was the third top producer in 1993 with 95,500 tonnes. In 1997, production decline drastically to 41,000 and from then production contracted. In contrast, the production of black tiger shrimp in Vietnam and India has escalated.

To add to the problems of farmers, credit is not easily available for all sectors of the industry as banks have been suffering from NPLs (non performing loans) of 20%. Leased ponds do not qualify for loans. Thus, it has been left to feed manufacturers and owner operators to lead the industry.



The hatchery is equipped with 30 ten tonne tanks for rotifer culture and larval rearing as well as a new egg washing equipment for the marine shrimp that has proven to be effective in removing virus, especially WSSV, from the eggshell or cyst.

R&D and hatchery support feed sales

Trials on techniques in farm management are tried and tested at OFC's R&D and demonstration farm in Carcar, 40 km south of Cebu City. It was formerly a milkfish farm with 46 ponds. Today, OFC uses it to farm shrimp, saline tilapia and several marine fish such as seabass, snapper, pompano and milkfish.

In this farm, six reservoir ponds are used as sedimentation ponds and to prepare green water for the 10 grow out prawn ponds currently being used. Green water culture which effectively reduced the growth of luminous bacteria (or lumbac) was developed by Prof Corre and was generally adopted by Filipino shrimp farmers in 1998. In the reservoir ponds, saline tolerant tilapia are stocked to maintain the phytoplankton populations at 500,000 to 800,000/ml.

Good biosecurity measures are practiced at the farm with a foot bath, tire bath, and hand wash at the entrance. This then continues with cleaning of equipment and nets with formalin after each usage. Prior to stocking postlarvae are given a formalin bath of 100ppm for one hour bath and also tested for WSSV and MBV although they have recently stopped using this procedure ever since organic fry production from their hatchery was perfected. The quality of postlarvae is tested in survival nets. Some 200 postlarvae are kept in hapas of 1m². The survival is then checked every 3,7,15 days after stocking. If survival is poor, it may be decided either to extend the crop hoping for better growth, or abort the stock altogether and start pond and water culture preparation again.

It was here that Prof Corre Jr developed protocols for probiotic applications in pond preparation. After a comparison of several brands of probiotics from Taiwan, Australia, Thailand, China, USA, and even domestically produced brands, the farm now uses a combination of encapsulated bacillus and enzymes, marketed for waste water treatment called BZT Waste Digester, for pond preparation. These are activated in 30 min to an hour. During grow out, another series of probiotics called BZT Aquaculture are used.

At the farm, trials on culture and feeding systems are carried out to develop sampling and feed schedules. Generally, the farm uses low volume water exchange in all ponds. This requires constant monitoring of suspended solids, ammonia, pH, alkalinity, etc. Green water from the reservoirs are used to replenish pond water.

The farm demonstrates the use of feeding trays. In each shrimp pond, four feeding trays are used to monitor feed intake. In other farms, the practice varies on the number of feeding trays. According to Prof Corre, Jr, for each feeding, they recommend 0.5%, 1%, even up to 1.5% of the daily feed ration to be placed in each feeding tray. Monitoring time fluctuates depending on the size of the shrimp.

There is also a hatchery for the production of saline tilapia fingerlings. These are hybrids of *niloticus* and *mossambicus X niloticus*. The production is 0.5 million per month of sex reversed fingerlings. It is one of four hatcheries in the Visayas producing saline tilapia suitable for culture at 30ppt salinities.





Alltech President Speaks

Dr. Pearse Lyons, President & founder of Alltech Inc., USA was in Bangkok recently. Below he shares his views on the Asian aquaculture industry and the role of Alltech to move it forward.

AAP: How does Alltech view its position in the aquaculture industry today?

We have been active in aquaculture for some years; but we are now dedicating more resources to increase our focus on this market. Nearly 10 years ago, I developed our first product for shrimp, SP604. By using this, some of the major feed companies in Latin America were able to elevate their feed performance.

The technology we developed for aquaculture focused, as all Alltech products do, on the health of the animal, whether shrimp or fish. Focusing on that, everything else falls into place. Alltech's mandate (in fact, our mantra) is that we solve animal health problems and, in so doing, improve performance.

Now, we have an opportunity to use our 25 years of experience in global animal production to bring solutions to some of the unique problems in aquaculture. The net result is that both aquaculture and Alltech will move forward.

AAP: What are the opportunities for Alltech in the aquaculture industry in Asia?

Asian aquaculture is an important and integral part of the global market in seafood. And we have seen how important aquaculture is, especially shrimp culture, in some Asian countries.

We pride ourselves on our innovation and research and we look forward to applying this to some of the problems faced by aquaculture in the region. We want to use our experience in solving challenges faced by the food and feed industries – issues such as traceability and food safety.

To provide solutions to those issues, Alltech products are produced under the ACE principle – products that are good for the Animal, the Consumer and the Environment. We are also committed to earning registration of our products, as shown by the fact that Sel-Plex is the only organic selenium product approved by US Food and Drug Administration.

This focus on farm and feed allows us to get closer to the entire production process and the traceability and food safety process. Also, our emphasis on products that improve the quality of the animals produced puts us at the forefront of the trend towards product differentiation and not simply competing in a commodity market.

AAP: What strengths would you focus on to achieve this?

Alltech is focused on three things: Creating solutions, innovations beyond the current way of thinking of things and thereby elevating performance.

To us, this is not about simply replacing antibiotics. It is about achieving better performance than what we have achieved by using antibiotics. It is about drastically reducing pollution in fish farms and shrimp farms and improving performance.

Alltech also has a strong commitment to research and development. As a privately owned company we are able to channel resources into

R&D. At our headquarters in Lexington, Kentucky, we have excellent research capabilities and we have established Alltech Bioscience Centres in Europe and in China. Although these are principally concerned with terrestrial animals, it is only a matter of time before we establish our first Aquaculture Bioscience Centre.

We also pride ourselves on our ability to understand a client's business and help to build it as partners. This is crucial if we are to develop solutions for the aquaculture industry that are focused on the problems faced by the industry.

AAP: What are your objectives specifically for the aquaculture feed additives segment in Asia?

As always, to do things differently, to promote traceability, promote quality, promote education, promote profitability for fish farmers and feed manufacturers. We do not see ourselves as simply an additives supplier but a solutions provider.

The Asian aquafeed industry is facing some challenges with the rising cost of raw materials and the demands of consumers for greater traceability, not just in how their food is handled but in how the animals are fed. There is also a clear trend toward improving the quality of the meat produced and a growing interest in such things as functional foods. This is already clear in the feed business in livestock. Aquaculture lags behind somewhat, but as more and more countries produce shrimp and fish, competition will increase and it will be important to differentiate in the marketplace.

We have seen how Alltech's Bioplex minerals and Sel-Plex have resulted in improvements in meat quality in pigs and poultry, as well as salmon fillet quality. We want to see the same improvements in Asian aquaculture species.

AAP: How do you see the contribution of the aquaculture industry to your global business?

The potential of aquaculture to contribute significantly to Alltech's global business is huge. We already have significant sales from the shrimp and salmon industry in Latin America. In the past year, our aquaculture business in Europe has shown a massive increase, with USD 1 million of aqua-sales in Turkey alone and there is increasing interest in other countries. We held an aquaculture business summit for Europe in Dublin in December that attracted over 30 attendees from some of the leading feed companies in Europe, and our aquaculture sessions during our annual Asia Pacific Lecture Tour attracted over 100 attendees from across the region.

As we are in more than 70 countries and have more than 320 trained technical representatives, several at PhD levels and with Veterinary qualifications, we are in a unique position to bring our message in whatever language necessary across the world.

Aquaculture in Indonesia Along the vannamee route

by Zuridah Merican



It was along this stretch of coastline in East Java, that the first batch of *Penaeus vannamei* shrimp broodstock was brought into the country in 1999. From then on, the culture of this white shrimp, locally called vannamee was quickly adopted by the rest of Indonesia. At present, even doubtful farmers around Medan have switched to this shrimp. Latest reports indicate production volumes of 190,000 tonnes of shrimp, 90% of which is estimated to be *P. vannamei*.



Hendra Sutanto, PT Empang Kuningan, Situbondo

Along this route, shrimp production is estimated at 26,000 tonnes per year. Some farmers also tried culturing *P. stylosis* as a substitute species when they suffered from repeated failures with the black tiger shrimp. But this did not take off as apparently, there were problems with marketing the shrimp to Japan, according to PT Suri Tani Pemuka (STP)'s sales manager, Haris Muhtadi. Although the advent of vannamee shrimp has helped resume culture activities, some 50% of ponds are still not operating.

Currently, the culture of this shrimp is based on two types of postlarvae. Those that are produced from locally reared broodstock and thus called "benur lokal" and those produced from imported specific pathogen free (SPF) broodstock and are called "benur impor" (benur = postlarvae). To date, the authorities have only given permits to four companies to import SPF broodstocks. These are PT Biru Laut Katulistiwa and PT Central Pertiwi Bratasena, both of which have hatcheries in Lampung, PT Tirta Mutiara Makmur in Situbondo and PT Suri Tani Pemuka's hatchery in Singaraja, Bali.

There are about 27 large and backyard hatcheries along the main road from Pasir Putih to Banyuwangi supplying postlarvae to surrounding ponds around Probolinggo, Situbondo and Banyuwangi and to as far as Kalimantan on Borneo Island. Most of them have switched from the production of the black tiger shrimp to *P. vannamei* when demand for the latter increased. As they continuously use pond reared broodstock, the quality of postlarvae has deteriorated



Hendra has installed 210 UV lamps over a 30 metres stretch of cement lined canal to eliminate disease carriers in incoming water.

over the years due to inbreeding.

"Farmers are aware that the growth performance of these postlarvae has been declining but most use local postlarvae. It is still possible to grow these to sizes of 70 pcs/kg in 120 days, although the culture period used to be much shorter. Production volumes are also declining. Their choice is related to the price of specific pathogen free (SPF) postlarvae which costs twice as much as 'local' ones which cost 15-18 Rp/pcs for PL15-18", said Haris.

Hendra Sutanto of PT Empang Kuningan, Situbondo said that he would use "benur impor" if there could be a guarantee that these postlarvae are disease free. He is doubtful on this aspect, but is confident that production targets and uniformity of size can be easily met. As is usual among industry members, there is a trust between

buyer and supplier of postlarvae. His sources of postlarvae are PT Surya Adisatwa Mina and PT Pantai Putih Makmur. The push to use 'local' postlarvae is also influenced by the credit terms provided by suppliers which can range from 1 to 3 months. Some farmers even pay after harvesting the shrimp.

Notwithstanding this, he sends samples of postlarvae to check for Taura Syndrome Virus (TSV), White Spot Virus Syndrome (WSSV) and Infectious Hypodermal and Hematopoietic Necrosis (IHHNV) at government and private laboratories equipped with PCR machines. According to Hendra, IHHNV has been detected in local postlarvae. A disadvantage of the 'local' postlarvae is the wide size variation during culture and to overcome this he uses two feed sizes in each pond.

Hendra, a former teacher started aquaculture 15 years ago. He is now a successful farmer who has seen the changeover from black tiger shrimp to vannamei shrimp. To date he has not experienced major disease problems but then Hendra has developed his own method of for the treatment of incoming water from the coastal waters (see box).

Typical of farmers in the area, his stocking density is currently at 150 to 200/m². Shrimp grow to 60-65 pcs/kg in 120 days. The total yield depends on the quality of the postlarvae. On average, he achieves 9-10 tonnes/cycle for a 4,000m² pond. The extrapolated yield is 20 tonnes/ha.

This is within the region's productivity value of 15 tonnes/ha (Arianto, pers comm.). In comparison, through partial harvests some farms in Lampung, have produced 30-35 tonnes/ha/crop. The final harvest comprises 40g individuals. Apparently in Lombok with relatively new ponds and good quality water, farmers are stocking up to 350/m² and have produced 35-50 tonnes/ha/crop

Despite these worries on diseases and postlarva quality, the industry in East Java is picking up as evidenced by the increasing sales of feeds to the region and expansion of the STP shrimp feed plant at Banyuwangi.

Banyuwangi shrimp feed factory expands

"The industry is picking up as feed sales, from the nine to ten major feed companies active in the area, total almost 4,000 tonnes per month. As more and more farmers are stocking *P. vannamei*, the feed volumes are increasing", said Arianto, Head of PT Suri Tani Pemuka's Banyuwangi Aquafeed Operations.

In 1990, STP started a shrimp feed plant in Banyuwangi to service the farms in the eastern part of Indonesia. At present, it has a 35% share of the feed market in the region. The balance is shared by Charoen Pokphand, Gold Coin, Feng Li, Grobest, Karka, Luxindo and other smaller companies. Its market stretches from East Java, Sulawesi, Bali, Lombok, Irian Jaya, Sumbawa to West Nusa Tenggara.

The initial capacity was 600 tpm and this year the capacity was increased to 1,200 tpm.

"The demand for feed is higher as the average feed conversion ratios have worsen from 1.3 to 1.5, attributed to the declining quality of postlarvae and survival rates. Farmers also stock at high densities and there is also uneven growth performance of shrimp.

The culture period has extended from 90-100 days to 120 days to attain the same size per kg", said Arianto.

"In today's competitive environment, we are not only maintaining our feed quality and increasing capacity with a new shrimp feed line,



From left, Arianto with Widyatmoko, R&D Manager

but we have to also increase our services".

The company already offers tests to detect diseases with its PCR machines at discounted prices for customers whereas water analysis is provided free of charge. Every 3 months, the company arranges for dialogue sessions for customers and farmers to exchange ideas and find solutions to problems. On line is a hatchery for the production of SPF postlarvae to supply customers.

Arianto said, "Most of our customers have stayed with us for a long time, and some for more than ten years. We are nurturing customers in the new culture areas in Bali and Lombok. Those that we have lost have left because of better terms offered by the competitors".



The team at PT Suri Tani Pemuka's Banyuwangi Aquafeed Operations



The number of paddlewheels in ponds are increased during the rainy season

Haris Muhtadi (left) and Totok Wijayanto. Haris Muhtadi is now with Alltech Aqua based in Jakarta

Innovation pays

When Hendra switched to the farming of the white shrimp, his learning curve was throughout three culture cycles. He started by stocking shrimp at 50-60/m² and harvested around 6 tonnes of shrimp per pond. Success came after the fourth cycle and from then onwards, he has increased his stocking density.

"Our survival rates estimated through sampling average 90%. Now, my best ponds yield 13.5 tonnes/4,000m² and 15 tonnes/5,000 m²", he said. Extrapolated this averages 30 tonnes/ha. He uses feeds for intensive culture of the marine shrimp produced by STP which contain 40% protein and those from Luxindo with 39% protein.

"Shrimp are cultured over 120 days and attain 55 pcs/kg. This depends on weather conditions. During the rainy season, we can achieve this size quite easily as water conditions such as temperature and pH are more stable and salinity lower. We solve the problems of lower oxygen by adding more paddle wheels," said Totok Wijayanto, farm technician.

Shrimp are sold to a processor at 29,000 Rp/kg (USD 3.2/kg) for sizes 70/kg and 33,000Rp/kg (USD 3.7/kg) for the 60/kg size (in June 2004, prices were 27-33,000Rp for size 70/kg). However, his cost of production is higher at 23,000 Rp/kg (USD 2.6/kg) as compared to the national average for costs of production for this similar size *P. vannamei* which is around 19,000 Rp/kg (USD 2.1/kg).

To eradicate bacteria and disease carriers, Hendra has developed an ultra violet treatment for incoming water. In this system, seawater filtered with a fine mesh flows through a central canal at a rate of 2,000 cubic metre/h. There are 210 UV lamps over a 30 metres stretch of cement lined canal. After this treatment, pond water is clear of vibrio and other planktonic organisms, according to him.

This has helped him as the farm has not experienced any major problems with diseases. In addition, all paddlewheels are cleaned every 4 months and probiotics, a combination of *Nitrobacter* and *Aeromonas* bacteria are used in the culture ponds at a rate of 1kg/pond. These are activated for two hours prior to addition into the ponds.



There are reports of disease occurrences in the farms in the area. As they share the same source for incoming water, Hendra said that ideally farmers should assist each other in monitoring disease occurrences.

"Adjacent farmers should notify neighbouring farms when they encounter any diseases so that the latter can avoid drawing in water for their ponds," said Hendra.

The farm located in Dusun Paras, Desa Duwet has a total of 18 ponds of which 13 are used for culture. All the ponds have cement walls and are 1.5 to 2m deep. Four ponds covering a total area of approximately 2ha are used as reservoir ponds. After UV treatment, water flows into these reservoir ponds where milkfish and tilapia are stocked.

What next? Hendra would like to try to culture the shrimp for a further 20 days and achieve a size of 40/kg. These 25g shrimp should fetch 45,000Rp/kg (USD 5/kg). He will attempt this with the 'local' postlarvae although there is no doubt that this is possible with 'imported' postlarvae. There are also expansion plans. Soon he will take over the adjacent land with abandoned ponds and operate these ponds.

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Limelight on Gondol

Researchers at GRIM in Bali have transferred their success in the breeding of two grouper species to industrial and backyard hatcheries along its northern coast. Next in the pipeline are the breeding of more species of groupers, Napoleon wrasse and the yellowfin tuna. They also need to wean the cannibalistic tiger grouper to artificial feeds, improve the general quality of broodstock and overcome disease problems.

From Research



The Gondol Research Institute for Mariculture (GRIM) was initially established in 1985 as a research station for coastal aquaculture. In 2001, it became a research institute for mariculture. At present, the institute has complete facilities for work on the breeding of several species of marine fish, diseases, feed development to environmental studies.

The recent surge in the culture of groupers in the region can be attributed to the success at GRIM in the mass seed production of the humpback grouper *Cromileptes altivelis* in 1998 and tiger grouper *Epinephelus fuscoguttatus* in 2000.

Researchers said that it was the basic research in the breeding of the milkfish which helped them achieve success in mass seed production of the groupers. Essentially, the protocols developed for the early feeding of the milkfish were modified for the grouper. In the case of the humpback grouper, researchers have managed to wean the species on to artificial diets quite easily and it may be similar with *E. coioides* which is the next species being studied. But a problem still remains with the more cannibalistic tiger grouper.

Dr Adi Hanafi (centre) is Director of GRIM. Ir Zafran (right) is in charge of the disease program and Dr Nyoman Adiasmara Giri (left) in larval nutrition. In the background is an indoor hatchery complete with facilities for the breeding, nursery and weaning to dry diets, constructed under a Danish development program.



.....Commercial

Simple models for hatchery systems were then developed which allowed backyard hatcheries producing milkfish fry to diversify into grouper fry production. It is this proliferation of backyard hatchery operators which has brought about an expansion of grouper culture in Indonesia and the region. Hatcheries in Bali now supply grouper fingerlings to the marine fish farms in Indonesia as well as to those in Singapore, Taiwan, Japan, Vietnam and Malaysia.

The small scale hatchery model developed by GRIM comprised of six 12m² tanks for phytoplankton culture, three 7.5m² tanks for rotifer culture and four 9m² larval rearing cement tanks and tanks as reservoir and water filtration tanks.



The more successful hatchery operator such as Sugud (left) then upgraded to an industrial level. He now exports milkfish and grouper fry to the region. Soon, he will carry out his own breeding work with broodstock acclimated in his hatchery.

The current demand is for the tiger grouper which sells at a lower price. Fingerlings sell for 600-700 Rp/cm as compared to 1,500 Rp/cm for the humpback fish. The tiger grouper is also a fast grower reaching 3cm in 40 days, according to Suko Ismi (right), technician at GRIM who works closely with backyard hatcheries operators.

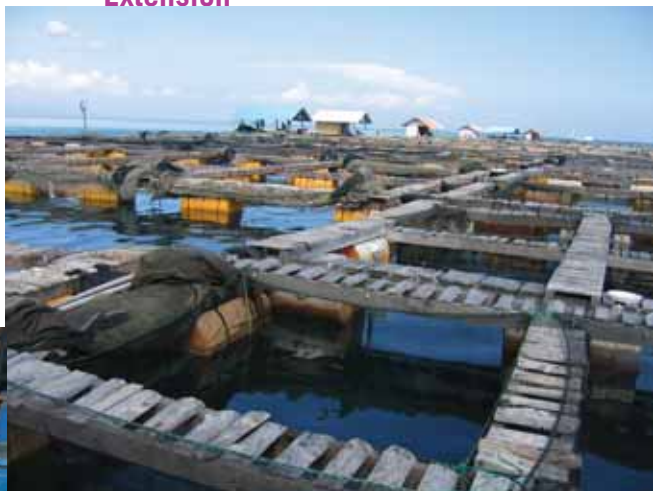
"They use live feeds for feeding larvae and sometimes find deformities when the sizes reach 6 cm. They will convey these problems to us and together we are helping them to seek solutions to this problem".

Egg production of the humpback and tiger groupers are no longer a problem as billions of eggs are routinely produced from wild broodstock. Larval humpback grouper are fed *Nannochloropsis* followed by *Brachionus*. From day 20, they can be weaned on to artificial larval feeds imported from Japan which costs from 200,000 Rp to 400,000 Rp per kg (USD 22 to 44/kg).

Enriched *Artemia* is still supplied up to 45 days. Fish reach 3cm in 60 days. Fingerlings are usually sold after 50-60 days. In cages, the nursery is easily continued with crumbles for 1-3g fish and slow sinking extruded pellets of various sizes manufactured by PT Suri Tani Pemuka are used for the grow out of 3g to market size of 0.5kg fish.



Extension



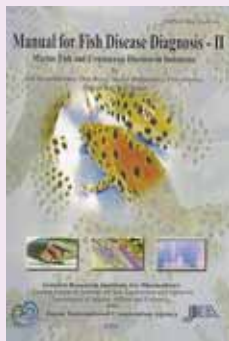
Work at the centre does not stop here. Researchers from GRIM also play an important role in ensuring a sustainable development of cage farming in the region. This then serves as a basis for development of the marine fish industry in Indonesia. Using satellite imagery and calculations on affluent discharge from cages, they provide information on the carrying capacity for cage culture in the coastal areas of Bali.



Tatam Sutarmat is responsible for the cage culture activities at GRIM. He also leads a group of farmers who meet frequently with researchers to find solutions on diseases and other problems encountered by the cage culturist in the bay off Gondol. There are 450 cages operated by farmers off Teluk Pegametan, Bali. Here 1,500 fingerlings each of 6cm in total length are initially stocked in these 9m³ nursery cages.

To support the work on seed production, the Institute's disease control unit monitors disease occurrences in fish kept in its facilities, in the hatcheries and cage farms in Bali as well as in other locations in Indonesia. Aside from documenting the various types of disease affecting marine fish and marine shrimp, the unit has developed simple diagnostic methods and treatment procedures for the control of various infections.

Two manuals to guide hatcheries and cage farmers have been published. In the culture of the humpback grouper, common diseases such as Virus Nervous necrosis (VNN) are attributed to infected fry. To control VNN fry are screened by PCR. Additionally, the unit is also working with health companies on ways to control diseases such as through vaccination programs.



Next.....

The complete land based facilities for the study on the early life history and breeding of the yellowfin tuna in GRIM, is the second such facility for tuna research in the world. The other is located in Panama. The tuna propagation project was initiated by the Overseas Fishery Cooperation Foundation of Japan (OFCF). It uses existing information on tuna breeding available in Japan to develop tuna propagation techniques under cooperation with Japanese and Indonesian scientists in this hatchery.



The project is headed by OFCF expert Dr Akio Nakazawa. Currently there are 32 broodstock of 2-3 years old being acclimated. These were captured from the Jawa sea around 40 km offshore from Bali. The broodstock are kept in two acclimation tanks, each of 10 metres in diameter and three metres deep and one spawning tank of 18 metres in diameter and six meters deep. They are fed frozen jack mackerel and squid.



Dr. Nakazawa said, "The optimal water temperatures range from 26 to 30°C. Higher temperatures may induce abnormal gonadal development. In the first successful spawning, achieved in October 2004, larval fish were fed S-rotifer but larvae did not survive more than 11 days in this time".

...and more challenges

In the pipeline are the breeding of several other species of groupers such as the marbled grouper *E. polyphekadion*, coral trout *Plectropomus* spp, Napoleon wrasse *Cheilinus undulatus* and cobia where there is a demand for the fingerlings. Activities are also being expanded to the breeding of marine ornamentals.

As for ongoing issues, top on the list is the weaning of the tiger grouper, important for the environmental sustainability of its cage culture and for it to move forward using extruded feeds. GRIM is also working closely with cage culturists and through group meetings monitor problems during culture, particularly those related to marketing and diseases. The latter is in line with the principle of "early detection and immediate action".



Microdiets – A decisive replacement in the weaning of larval fish

By Trine Karlsrud

Using an off-the-shelf micro feed, from an early stage of production can reduce production risks and costs. Furthermore, it will contribute to more standard conditions resulting in more predictable production of high quality fry.

Live feed and metamorphosis

Using live feed requires separate biological systems to that of fish juveniles and it therefore increases the complexity and uncertainty during juvenile production. Supplies of Artemia changes from year to year, which again influences the price and quality of this product. Live feed has certain advantages compared to dry diet in that it stays in the water column for a longer time and is therefore available to the larvae for an extended period. But live feed can carry microbial risks that can be devastating to a hatchery.

Metamorphosis marks the transition to the definitive phenotype of the digestive system, the respiratory system, the visual and other neural systems, muscles, skin, pigmentation and behaviour. Therefore data obtained in juvenile fry are of little help when studying the requirements of larval stages. Mechanisms of digestion and absorption change during larval development. It follows that nutritional requirements also change. Metamorphosis consumes energy and to have a successful metamorphosis it is important that there is an accumulation of lipid reserves in larvae during pre-metamorphosis. Deficiency in energy reserves leads to incomplete metamorphosis and high mortality rates.

Research in larval nutritional requirements

IFREMER's research into nutritional requirements of marine larvae contained some revolutionary thinking. By studying the onset of digestive enzyme activity during the larval development of the European sea bass, they were able to formulate a diet that corresponded to the specific requirements of marine fish during its very early development. These studies then allowed the definition of optimal protein, dietary fat and phospholipids levels from both quantitative and qualitative point of view. It is established through research that larvae have digestive enzymes from first feeding, but these are different from enzymes found in fry and adult fish. Therefore, raw ingredients and formulation of larval diets have to be adapted to suit this.

Larvae have a specific requirement for phospholipids. Phospholipids are required for synthesis of lipoproteins, which are molecules transporting lipid in the blood. During early larval stages with high growth, larvae cannot synthesise enough phospholipids and it must be provided in the diet.

Cahu et al. (2003) reported increasing growth, decreasing malformation and increased survival in European sea bass larvae fed increasing phospholipids levels from 3% to 12%. Larvae have no stomach and before weaning they have a low capacity to digest and absorb complex molecules. Therefore, the larvae rely on some of the nutrients in the diet to be partly hydrolyzed (proteins) that can be further digested by peptidases in the enterocytes.

The solution

Using this information on requirements, a revolutionary pre-starter diet, designed to replace Artemia in first feeding of marine fish larvae was then developed. Skretting manufactures Gemma Micro under

exclusive license from INRA/IFREMER according to a specific formula which has been patented. The feed is virtually "hand-made" in a purpose built facility in France. Gemma Micro is rich in amino acids, essential fatty acids, vitamins, minerals and other important nutritional compounds to give larvae a fast and healthy start.

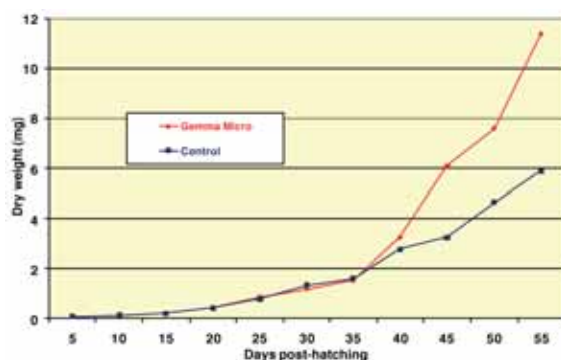
Experimental trials

In a series of experiments with three species of marine fish, the growth performances of Gemma Micro in larval fish were evaluated. The results are discussed here.

In the European sea bass (*Dicentrarchus labrax*) from day 5–25 post-hatching (PH), the larvae from the control tanks and from the Gemma Micro tank all received the same feeding schedule except that in the treatment tank small amounts of the micro diet were sprinkled daily on the water surface. In this group, between day 25–35, the quantity of Artemia was fixed and the amount of micro diet was rapidly increased using a Raunes Micro Feeding System. In the control tanks, the amount of Artemia was further increased on day 45 PH and the larvae were co-fed with diet from a major competitor.

The results show that the weight of sea bass larvae grown on the micro diet was twice that of larvae that were reared on the competitor diet (Figure 1). The quantity of Artemia used in the micro diet group was only 20% of the control group. The survival was slightly higher in the micro diet group and the quality of the larvae was also superior with less malformed fish.

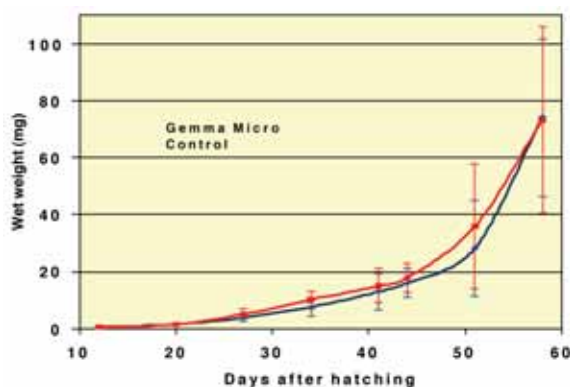
Figure 1. Growth of Sea bass larvae (mg dry weight) fed 20% of normal Artemia ration and Gemma Micro compared to a control group fed the normal Artemia ration together with competitor co-feeding diet.



The diet was also well accepted by Sea bream (*Sparus aurata*) larvae and they can be fed on this diet from the very first day of feeding. Under commercial conditions the micro diet phased out Artemia over a period of 10 days from day 16–25 PH, and the larvae were only fed this micro diet only from day 26 PH, whereas the control group was fed Artemia and a co-feed between days 26–45 PH and followed by dry feed only.

Early weaning onto the micro diet resulted in as good a survival as in the control group (12 versus 11%). Swim bladder inflation on day 41 PH was good in both groups (98%), and growth was comparatively better in fish fed the micro diet till day 50 PH (Figure 2). The reduced growth seen in the treatment group compared to the control group may be an indication of underfeeding caused by too small feed particles size as the fish at this point should have been transferred to Gemma which is Skretting's next feed in its marine range.

Figure 2. Growth (mg body weight) of Sea bream fully weaned onto the micro diet on day 26 PH (in red) compared with control group fed Artemia and co-feeding feed (in blue) between day 26 and 45 PH and fully weaned from day 46 PH.

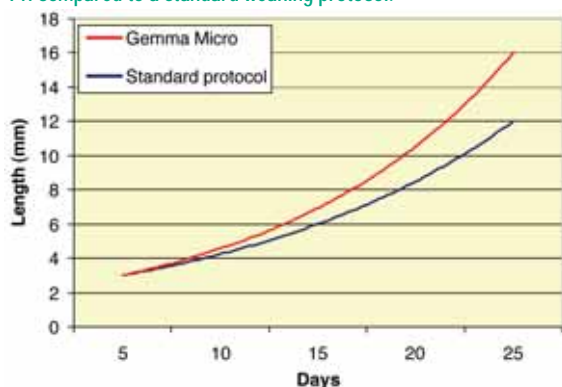


"Larvae *Barramundi* larvae were fully weaned 16 days post hatch and growth was higher by 25% higher"

In the Asian seabass or Barramundi (*Lates calcarifer*), Gemma Micro can successfully replace all Artemia in commercial Barramundi hatcheries. From day 0-6 PH, the larvae in both this micro treatment diet and control groups were fed rotifers only, except that in the treatment tank small amounts of the micro diet were sprinkled on the surface every day. In the micro diet, from day 6-15 PH increasing amounts of this diet and decreasing amounts of rotifers were fed. Larvae were fully weaned by day 16 PH. In the control tank increasing amounts of Artemia were fed while co-feeding with a competitor diet.

Results showed that larvae weaned on to the micro diet grew 25% faster than larvae weaned using standard weaning protocols (Figure 3). Weaning mortality was only 5% and malformation rate was less than 1% (at fish size 100 mm) for the micro diet fed larvae. Less size variation in the micro diet fed fish was also observed compared to standard weaning protocol. This is a great advantage since Barramundi need frequent grading when they reach the age of 3 to 4 weeks.

Figure 3. Growth (mm length) of barramundi fully weaned from 16 PH compared to a standard weaning protocol.



Raunes Micro Feeding System

Micro feeding system

When feeding dry feed at an early stage in larval development, feed allotment and distribution in the tank must be managed differently from live feed. Distribution of dry diets in the tank is essential for early weaning success, and without proper attention to this issue one runs the risk of overfeeding the tank, while underfeeding the larvae and compromising the water quality and exchange.

Raunes, a cod hatchery in Norway, has developed and produces a special micro feeding system, which allows an even distribution of dry feed in the tank. The feeding system mixes dry feed and water in a funnel. The mix is then led into the tank just below the surface through 12 pipes.

Bottomline

This diet is the result of extensive research, which identified that marine fish larvae require pre-metamorphosis diets with easy digestible protein and high content of energy and phospholipids. Good distribution of dry diets in the tank is essential for success in early weaning and systems are available to support this.

Commercial trials and new regular production has shown that the right diet with the right feed distribution significantly reduces dependency on Artemia in all fish species tested so far. This diet offers hatcheries exciting opportunities to increase survival rates, simplify operations and reduce costs.



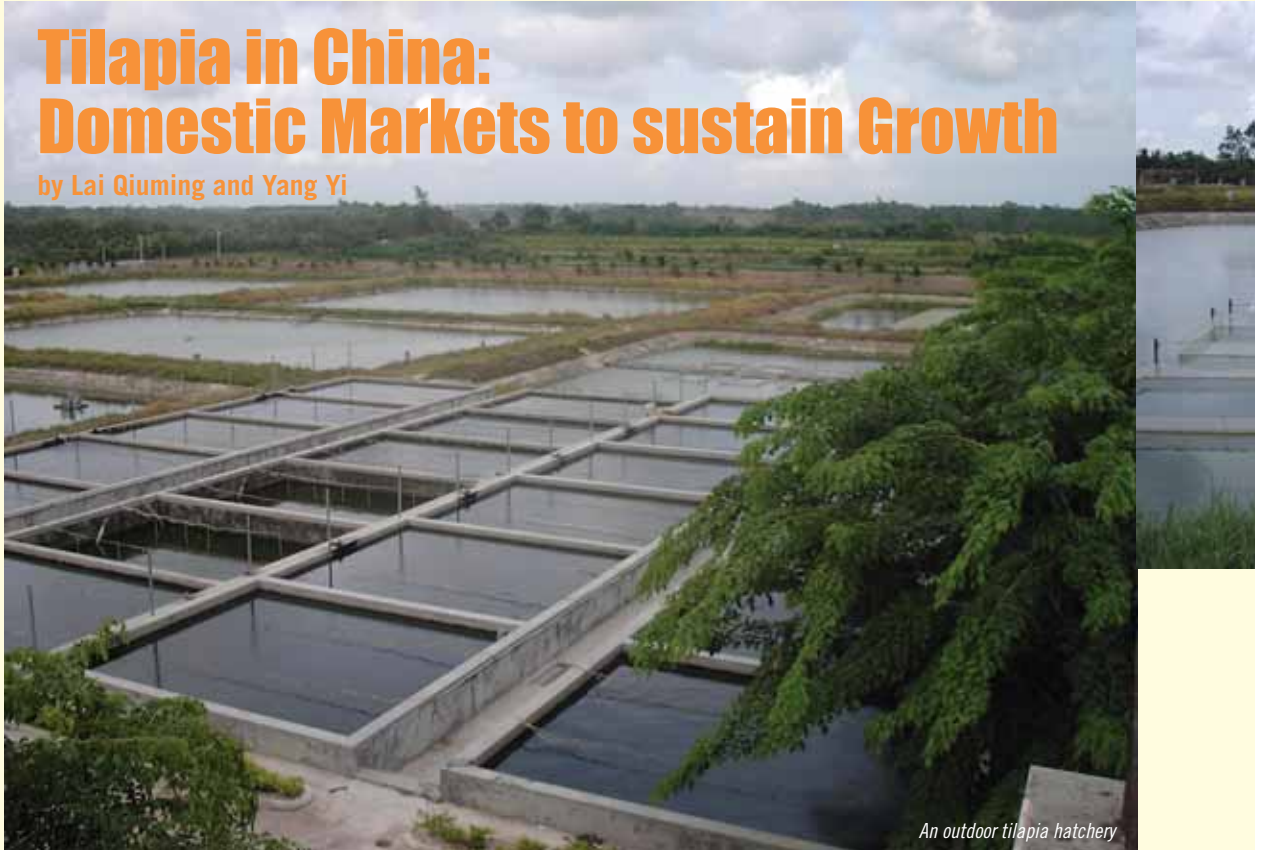
Trine Kalstrund Karlsrud is Product Manager, Hatchery diets, with Skretting. She is an expert on marine fish larval rearing and is a key member of the Skretting international product team for Gemma and Gemma Micro. For more information regarding these diets and the Raunes Micro Feeding System, email: trine.kalstrud@nutreco.com.

Reference

Cahu et al., 2003. Effect of dietary phospholipid level and phospholipid:neutral lipid value on the development of sea bass (*Dicentrarchus labrax*) larvae fed a compound diet. *British Journal of Nutrition*, 90, 21-28.

Tilapia in China: Domestic Markets to sustain Growth

by Lai Qiuming and Yang Yi



An outdoor tilapia hatchery

In China, the culture of tilapia has expanded rapidly with the introduction of new strains, success in all-male tilapia production and improvement in both nursing and grow-out technologies. An expected increase in per capita consumption of tilapia, large domestic markets and technology improvements indicates a huge potential for further expansion of tilapia culture in the country.

Since 1997, tilapia production in China has exceeded 50% of world production. Production increased from 18,100 tonnes in 1984 to 706,585 tonnes in 2002, with an average annual growth rate of 25%. Currently, tilapia is among the top six of farmed freshwater fish in China. Alone, it accounted for 4.14% of the total freshwater fish production in 2000 (DOF, 2001).

Since the successful hybridization between female Nile tilapia and male blue tilapia (*O. niloticus* X *O. aureus*), the Nile-Blue hybrid

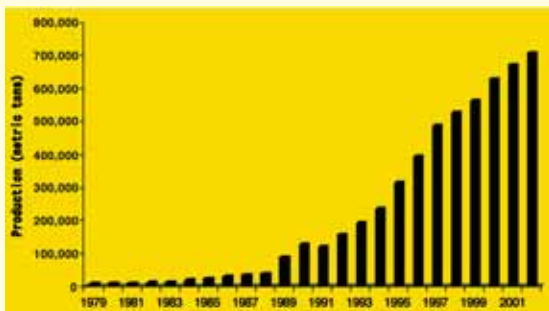
tilapia has become the most important tilapia strain cultured in China, especially in Southern China. However, Nile tilapia is the dominant cultured tilapia species in Northern China such as Shandong province.

The main tilapia producing areas are in the sub tropical provinces of Guangdong, Fujian, Guangxi, and Hainan. In 2000, production from these four provinces accounted for 83.1% of the total production for China. The largest producers were Guangdong (249,446 tonnes), followed by Fujian with 105,589 tonnes (Figure 2). Culture is year round in these provinces. Other advantages include the relatively long history of tilapia culture, good tilapia selection programs, well-developed large scale- tilapia hatcheries, well-trained researchers and extension workers.

The fifth largest tilapia producer in China is Shandong province, which produced 27,937 tonnes and accounted for 4.4% of the total tilapia production in China in 2000 (DOF, 2001). However, as the climate is temperate, the grow-out period here is short at 4-5 months.

More than 20 tilapia processing factories have been established by investors from Taiwan, Hong Kong, Macau and mainland China, and their annual processing capacity has reached 200,000 tonnes. Most of the plants are HACCP approved and are accredited to export to markets in the EU, USA and Japan. The well-developed processing industry has also fostered the further expansion of tilapia culture in these provinces.

Figure 1. Annual production of tilapias in China (sources: DOF, 1979-2001; FAO FISHSTAT Plus).





Nursing fry in ponds



Fry production methods

Small-scale farmers harvest the naturally occurring fry from grow-out ponds, nurse them to large fingerlings (30-50 g in size) in nursery ponds, select male fingerlings for grow-out production and use female fingerlings as protein source of poultry feed. This method is mostly adopted by small scale farmers in rural areas to save cost. However, the quality of such fingerlings is poor, due mainly to inbreeding. This method is also labour intensive and the supply cannot meet the requirements for large-scale grow-out production.

A dozen or so of tilapia hatcheries have been established in Guangdong and Hainan provinces. They produce about 1 billion Nile-Blue hybrid tilapia fry annually. Broodstock Nile tilapia and blue tilapia used in the hatcheries are purchased from research institutes or tilapia stock farms to ensure pure strains, thus the seed quality is good with a high percentage of male fish.

In most hatcheries, breeders are stocked at 1 fish/m² at a ratio of 3:1 of with female Nile tilapia to male blue tilapia in earthen ponds of 1,200-2,500 m² and 100-120 cm water depth. Breeders are fed with artificial feed (32-38% crude protein), twice daily (1100 and 1700 h) at 0.5-1.0% body weight per day. A few days later, Nile-Blue hybrid tilapia fry are harvested by using fine mesh nets. These are

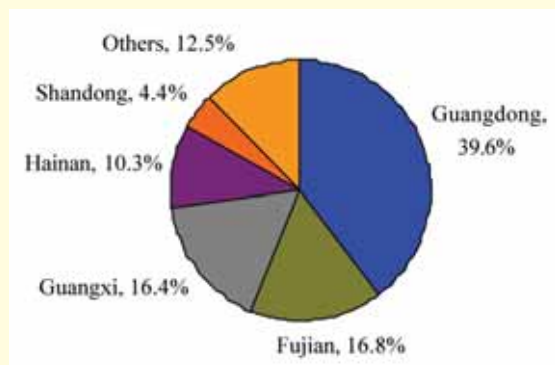
distributed to other parts of China, nursed in local nursery farms to 2-3 cm long, and sold to farmers at an average price of 0.1 Yuan/fry (1USD=8.2 Yuan). The percentage of males ranges from 85% to 90%.

In some hatcheries, the male hormone-17-methyltestosterone (MT) in feed containing 38-40% crude protein and included at 50 mg MT/kg feed is used to treat Nile-Blue hybrid tilapia fry to increase the percentage of males to 98-100%. The swimming-ups are harvested and stocked at 4,000/m² in outdoor cement tanks of 20-50 m² and 100-120 cm water depth. Concentration of dissolved oxygen in the tanks is maintained above 2.5 mg/L through 24-hours of aeration.

The hybrid tilapia fry are fed MT-feed 4 times daily (0700, 1200, 1800 and 2200 h) at 10-15% body weight per day for 15-18 days. On reaching 2.5 cm long, the fry are transferred to hapas suspended in earthen ponds for nursing for 4-5 days before sale. Normally survival ranges normally from 90% to 95%.

GenoMar ASA has established a large hatchery (GenoMar Supreme Hatchery China, GSHC) in Hainan province in cooperation with a Chinese company for a large-scale production of the GIFT-strain (Zimmermann, 2002). Sales of the off-spring from the introduced 2,000 breeders in 2001 started in June 2002. Since then, 30 million have been sold mainly to Guangdong province followed by Hainan province (Zimmermann, per. comm.)

Figure 2. Production of tilapias by the main producing provinces in China in 2000 (source: DOF, 2001).



Grow out in freshwater/brackishwater ponds

Intensive culture in freshwater/brackishwater ponds is the main system in the top four tilapia producing provinces. The size of culture ponds generally range from 0.2 to 0.5 ha, with 1-3 paddlewheel aerators per ha of surface area. Fish are stocked at 30,000 – 37,500 fish/ha, fed with artificial feed (28-35% crude protein) 2-3 times daily at 6-10% body weight per day for small size fish (<100 g), 3-6% for medium size fish (100-250 g), and 1.5-4% for large size fish (300-800 g).

Fish are harvested after 150-180 days of culture at average sizes of 600-800 g/fish. Gross yields from these ponds range from 15-20 tonnes/ha. Feed conversion ratio (FCR) range from 1.5 to 2.0. Average market price is 6.5-7.0 Yuan/kg. Tilapia are also intensively cultured in tanks in temperate regions such as Shandong province, using heat effluent water from power plants (Li and Graham, 2003).

In the southern and southeastern coastal areas of China, many abandoned and existing shrimp ponds have been converted to intensive tilapia culture ponds. Aeration equipment previously for shrimp farming are used. Most of the ponds were built in 1980s and have been abandoned because of crop failures in shrimp farming due to diseases and eutrophication of coastal waters.

The main tilapia strain cultured in brackishwater is Nile-Blue hybrid tilapia. Prior to stocking, the hybrid tilapia are acclimated gradually to 15‰ salinity. The salinity level in ponds should be controlled below 20‰, beyond which the hybrid tilapia grow poorly or may even die. Practices of the intensive culture of the hybrid tilapia in brackishwater are similar to those in freshwater.

Polyculture of tilapia with other species in semi-intensive ponds is the dominant practice in most parts of China. The species composition in polyculture ponds varies at different areas, but the most common model is polyculture with Chinese carps.

Integrated fish/duck culture system

This is also common in the top four tilapia producing provinces. Pond sizes are 0.6-1.5 ha, and duck houses are often located near pond dikes. Tilapia are stocked at 15,000-22,500 fish/ha, while duck density ranges from 2,000 to 3,000/ha. No aeration is used. Duck manure is the sole nutrient source. When ducks are sold, the fish are 150-200 g in size and are then fed artificial feed (28-30% crude protein) twice daily at 2-4% body weight per day, until harvested at 600-800g. Gross yields range from 7.5-12 tonnes/ha and FCRs range from 0.8-1.2, after 180-240 days of culture.

Cage culture

Tilapia are also popularly cultured in floating cages in lakes, reservoirs and rivers. Cages are usually 6 x 4 x 3 m. Fish (>50 g) are stocked at 100-150 fish/m² in cages, fed with artificial feed (28-35% crude

protein) 2-3 times daily at 7-10% body weight per day for small size fish (< 100 g), 4-6% for medium size fish (100-250 g) and 1.5-4% for large fish (300-800 g). Fish are harvested after 120-150 days of culture, at sizes of 600-800 g and gross yield of 30-60 kg/m³. FCR ranges from 1.5 to 2.0.

Flow-through culture

Flow-through ponds are usually built in mountainous areas using water from reservoirs, rivers/streams, irrigation canals and springs. The ponds range from a few to hundred square meters in surface area and water in ponds is exchanged 300-400% per day. Fish are either monocultured or polycultured with carps. Fish are stocked at 30-80/m² and fed with artificial feed (28-35% crude protein) 2-3 times daily at 3-6% body weight per day. The culture cycle is 160-200 days, and gross yield ranges 20 to 30 kg/m². The total area of this culture system is quite small, due mainly to poor infrastructure such as transportation in mountainous areas.

Integrated tilapia/rice culture

Tilapia culture in rice fields is mainly practiced in Guangxi, Sichuan and Hunan provinces. Tilapia fingerlings of 5 cm size are stocked at 4,500-7,500 fish/ha in rice fields about 10 days after transplanting rice seedlings. No artificial feed is given and growth is solely dependent on natural food. Fish are harvested at about 150 g, and gross yields range from 500-1,100 kg/ha after 100 days of culture. Due to the small size, the tilapia can only be sold to nearby farmers in local markets.

Constraints for future expansion

Seed quality and quantity

With the rapid development of tilapia culture, existing tilapia hatcheries cannot meet the huge demand for tilapia seedstock. In China, tilapia



In cage culture, fish are harvested after 120-150 days of culture, at sizes of 600-800 g and gross yield of 30-60 kg/m³

seed production seems to be dominated by small number of large hatcheries. Probably, tilapia seed production should be decentralized, and more small hatcheries are needed.

Inbreeding has resulted in slow growth, poor reproduction and production performance, reduced disease resistance and low male percentage of Nile-Blue hybrid tilapia. Some efforts have been made to solve such problems through the introduction of pure tilapia strains from their original regions and enhancing tilapia genetic research and breeding programs. Several state-owned tilapia stock farms have been established in Guangdong, Shandong, Jiangsu and Hainan provinces to maintain tilapia strains and conduct genetic breeding programs.

Product quality

Tilapia is cultured mostly by small-scale farmers with insufficient technological knowledge and poor management, consequently producing poor quality products. The model "company + base farm + farmers" is practiced by some large processing companies. Under this model, the companies provide good quality seeds, feed, technical services, and buy back harvested fish. This model may be a good way to link small-scale farmers with large markets, to ensure seafood safety, and to enhance the healthy development of tilapia culture.

Bottomline

China is major supplier of tilapia in US markets. It accounted for 31% or 41,200 tonnes in 2002. However, this amount is less than 6% of total tilapia production in China (Fitzsimmons, 2003). More than 94% of tilapia produced in China is consumed domestically. Average seafood consumption per capita in China is 10.3 kg in 2000, which is lower than the world average level (Li, 2002). Thus, whilst tilapia production in China is already very high relative to that in other countries, production, per capita consumption of the fish remains relatively low. An increase in domestic demand will push considerably for further expansion in production (Li and Graham, 2003). With the improvements in tilapia genetic breeding, nutrition and feed technologies, and production technologies, there is a huge potential for further expansion of tilapia culture in China.

(This paper was adapted from "Tilapia culture in China", presented at the 6th ISTA Conference on Tilapia, Manila, Philippines, 12-16 September 2004)

References are available on request from the editor



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History of Tilapia culture in China

Tilapia culture started in the 1960s with the introduction of the Mozambique tilapia (*O. mossambicus*) from Vietnam in 1956 (Xia, 2000). The disadvantage of this species was its small size and slow growth. The poor cold-tolerance of the fish limited its culture mainly to Zhanjiang and Hainan prefectures of Guangdong province.

In 1978, a hybrid of the Nile tilapia (*O. niloticus*) and Mozambique tilapia produced a more superior strain for culture. Growth of the hybrid tilapia (Fu So Fish) was 30-125% and 10-29% faster than Mozambique tilapia and Nile tilapia, respectively (Lai, 2003). This hybrid had larger size, better flesh, small size difference between male and female, and better cold-tolerance. Culture quickly spread in many provinces such as Guangdong, Guangxi, Jiangsu, Zhejiang and Hainan.

In 1984, the Nile-Blue hybrid tilapia from female Nile tilapia and male blue tilapia was successfully produced and since then this new hybrid has emerged as the most important tilapia strain in China. Its attributes include its high male percentage (85-90%), fast growth, large size, good cold-tolerance, and tolerance to a wide range of salinities. This advantage of high male percentage has increased both production and economic returns of tilapia culture.

The GIFT (Genetic Improvement of Farmed Tilapia) strain of Nile tilapia, developed by ICLARM in Philippines, was introduced to China in 1994. The 9th generation of GIFT strain (GIFT-strain Super Tilapia, or GenoMar Supreme Tilapia™) was introduced to China in December 2001 (Zimmermann, pers. comm.). When compared to the local commercial strain in China, the GIFT-strain Super Tilapia grew more than twice as fast (Zimmermann, 2002). In March and May 2004, a new generation of GenoMar Supreme Tilapia™ with improvements of 20% increase in growth rate and 10% low in FCR was introduced to China by GSHC (Zimmermann, per. comm.).

Since the 1990s, the red tilapia (*O. spp.*) has become more and more popular, due mainly to success in the strain selection of red tilapia and preference of domestic consumers. In 2000, Charoen Pokphand Foods Public Co. Ltd. (CPF) of Thailand introduced 100,000 Thai red tilapia from Thailand to Hainan province for distribution and seed production in its own farm.

Show Preview

World Aquaculture Bali, May 2005



A broad cross section of the global aquaculture industry is expected to attend the World Aquaculture 2005 Trade Show which returns to Asia. At printing time, organizers said that some 77 companies have booked stands. The aquaculture and aquafeed industry will be well represented by suppliers of complete feeds, feed ingredients, micronutrients to pond equipment and disease diagnostic services. We feature some of them in this preview.

The trade show will open on Tuesday 10 May to Thursday 12 May. The venue is the Bali International Convention Centre, Nusa Dua, Bali.

For more information on how you can participate in this show, Contact the following
John Cooksey, Tel: +1 760 432 4270 Fax: +1 760 432 4275 Email: worldaqua@aol.com
Royalindo Expoduta, Hotel Wisata International, Office Tower Suite 302, Jalan MH Thamrin, Jakarta 10230 Indonesia,
Tel: +62 21 314 0982, Fax: +62 21 315 0886 Email: giri@royalindo.com

Complete Feeds & Feed Additives



DSM Nutritional Products will introduce their new products at the show. CAROPHYLL® Pink 10% CWS is a newly formulated astaxanthin product that provides greater flexibility in feed manufacture. RONOZYME® P (L) is used to improve phosphorus utilization in feeds for farmed fish. RONOZYME® P (L) hydrolyzes phytates and thereby increases the availability of phosphorus and other essential nutrients.

The company is a major supplier of vitamins, carotenoids and enzymes to the animal farming industries throughout the world, with aquaculture playing an important role. Micronutrients are added to the feed in order to provide fish and shrimp with a complete, balanced diet. Vitamins, minerals, and carotenoids have to be provided in the diet, since fish have a limited ability to bio-synthesise.

*DSM Nutritional Products, Aquaculture Centre Asia Pacific, Rovithai Limited, 17/1 Fl., Maleenont Tower, 3199 Rama IV Road, Klongton, Klongtoey, Bangkok 10110, Thailand
Tel: +66 2 264 9800 Fax: +66 2 264 9899, +66 2 264 9844
Web: www.dsmnutritionalproducts.com
Contact: Dr. Jacques Gabaudan
Email: jacques.gabaudan@dsm.com
Booth: 202 & 203*

INTEQC Feed is one of the top three shrimp feed manufacturers in Thailand. For the black tiger shrimp, the company markets the brand 'Inteqc' with 40% crude protein whilst 'Wave' feeds for white shrimp

P. vannamei has 38% crude protein. 'Neofeed' with 35% crude protein is for other marine shrimp.

*Inteqc Feed Co., Ltd,
77/12 Moo 2 Nakhok Muang, Samutsakhon 74000 Thailand
Tel: +66 34 851 211, +66 34 851 219 Fax: +66 34 851 197
Email: inteqcfeed@inteqc.co.th
Contact: Dr Dhanapong Sangsue, Technical Manager
Email: dhanapong@inteqc.com
Booth: 173*

PT. Suri Tani Pemuka will display its new range of grow out feeds for the grouper (KRA) and Asian sea bass (KPA). The KRA starter feed has feed particle size of less than 5.00mm and protein of 51-52% and for grower, the feed particle is more than 7.00mm with 49% protein. KPA feed contains 45-47% protein.

The company, established in 1987, is one of the largest integrated aquaculture companies in Indonesia. Its business ranges from shrimp hatchery, shrimp and feed production and cold storage. Currently it operates shrimp ponds in East Java and South Kalimantan, a shrimp hatchery in Bali, 3 cold storage facilities (East Java, WestJava and South Kalimantan), and 3 feed plants (2 plants in East Java and oneplant in West Java). The core business of the company is aquafeed. At its 3 plants it produces shrimp feed, fish feed (sinking and floating) and slow sinking marine fish feed.

*PT. Suri Tani Pemuka,
JL. H.R. Moch. Mangundiprojo km 3.5 Sidoarjo, East Java, Indonesia 61252.
Tel: 62 31 896 3326 Fax : 62 31 896 3260
Web: www.japfacomfeed.co.id
Contact: P. Hidayat (Vice President)
Mobile: +62 811 322 574
Email: pdayat@sda.japfacomfeed.co.id
Booth: 186*



Vet Superior Aquaculture Co., Ltd. was the first company to create "hydrolysed shrimp protein" from shrimp shells which has been formulated into aquafeed (larval feed, feed supplement, etc.). This was the most advanced biotechnology transfer from the Thai government. The company also markets products for aquafarms such as zeolite, premix, probiotics, antibiotics and disinfectants.

New at the show will be new larval diets for shrimp and fish (V.S.F., L.Z.M., MP Feed, MP Plus, Lion-Star, Golden Brine Shrimp Flake and Golden Spirulina Flakes) and feed made from hydrolysed protein.

*Vet Superior Aquaculture Co., Ltd, 267/20-21 Soi Sathupradit 15, Sathupradit Rd., Chongnonsee, Yannawa, Bangkok 10120 Thailand
Tel: +662 285 5506 Fax: +662285 5475*

Web: www.vetsuperior.com

Contact: Dr.Winai Chottianchai; Mobile: +669-2025422

Email: chottianchai_winai@hotmail.com

Booth:100



Welltech Biotechnology Products Co., Ltd deals strictly with aquatic feed and aquaculture products. They will show their new product range "Z.M.F., Focus, PL Flake, Dragon Brine Shrimp Flake and Dragon Spirulina Flake". Also included will be "Verotech" which is for improving water quality and for the eradication of pathogens and bacteria.

The company manufactures larval feeds using hydrolysed shrimp protein as a major ingredient, zeolite, feed additives, premixes, etc. It is also a leading supplier of antibiotics, disinfectants, liquid vitamins, etc. produced from a GMP and ISO certified pharmaceutical company and is very well accepted in the region.

*Welltech Biotechnology Products Co., Ltd. 267/22 Soi Narathiwat 22, Narathiwat Rd., Chongnonsee, Yannawa, Bangkok 10120 Thailand
Tel: +66 2 678 9037 Fax:+66 2 678 9039*

Web: www.welltechbio.com

Contact: Dr.Siriporn Chottianchai; Mobile: +66 1375 6430

Booth: 101

PT Surya Adisatwa Mina, a leading shrimp hatchery is situated DS Landangan Kec Kapongan Situbondo, Indonesia. It also supplies shrimp and grow out products. At the show, it will display Artemia with 90% hatching rate, feed supplements and water treatment and disinfectants.

*PT Surya Adisatwa Mina, Jl Kranggan 107-109, Surabaya 60251, Indonesia
Tel: +62 31 532 6526 Fax: +62 31 531 5404*

Contact: Surjawan Tandyo Mobile: +62 81 651 3338,

Email: samfish@indosat.net.id

Booth: 214

Feed Manufacturing



Wenger, USA will introduce the new Wenger External Density Management System, or EDMS which can give customers precise control of final product densities and can increase capacity over vented configurations by as much as 25 to 50 percent. The EDMS is a particularly important advancement for the aquafeed industry, as it will allow processors to make both floating and sinking feeds with a wide range of properties—without the need for extruder configuration changes.

As part of the patent, Wenger developed a back pressure valve that allows the operator to adjust specific mechanical energy (SME) online for control of critical product properties. And as the second part of the equation, the EDMS includes a new external density chamber. Officially patented as a "superatmospheric post-extrusion product treatment assembly", it utilizes compressed air to control pressure in the chamber. This turns allows the operator to better control density and other critical properties of the final product.

Wenger Manufacturing, Inc.,

714 Main Street, Sabetha, Kansas 66534, USA

Contact: Doug Baldwin Email: dbaldwin@wenger.com

Tel: +001 816 891 9272

Web: www.wenger.com

Booth:312

Health and Nutritional solutions



Nice Garden of Taiwan deals specifically with livestock, aquaculture and related biotechnology products. At the show it will introduce new products such as WSSV Detection Kits, Nitrofurans (AOZ) Elisa Diagnostic Kits.

Based in Taipei and with two branch offices in Tainan and Kaohsiung, the company has a professional and dynamic team consisting of veterinarians, animal science and aquaculture experts. It was founded in 1984 and over the past two decades, Nice Garden has integrated strong and dynamic domestic and international commercial channels to serve the non-static global market. It supplies larval feeds, quality raw materials, feed additives, probiotics as well as test kits for antibiotics detection and PCR for shrimp viruses detection.

Nice Garden Industrial Co., Ltd.

9F-2, 98 Nanking E. Rd, Sec. 2, Taipei, Taiwan, 104

Tel: +886 2 2560 3566 Fax: +886 2 2560 3888

Kaohsiung Branch:

11F-7, No: 206 Kwang-Hua 1st Rd, Kaohsiung, Taiwan, 802,

Tel: +886 7 226 7180 Fax: +886 7 226 7184

Web: www.nicegarden.com.tw

Contact: Ms. Fiona Lee, Email: aqua@nicegarden.com.tw

Booth: 102 & 103

INVE, the multinational group of companies, active in agri- and aquaculture provides nutritional and health solutions in fish and shrimp rearing through its aquaculture business units. It also leads in the development, production and commercialisation of a complete range of high quality products.

Inve will introduce the affordable EPAC diets in addition to its Frippak and Lansy range for larval and nursery shrimp nutrition. The compound starter and weaning feeds include the NRD range. There will be Selco's rotifer and artemia enrichment products for optimal live feed quality, concentrates and specialties for aqua feedmills and preventive solutions for healthy shrimp and fish production from the Sanocare, Sanolife and Sanoguard ranges.

Inve Asia Services Ltd. 471 Bond Street, Tambon Bangpood, Amphur Prakkred, Nontaburi 11120, Thailand
 Tel: +66 2 960 0200, Fax: +66 2 960 0499 Web: www.inve.com
 Contact: Nisaratt Iass, Email: iass@inve.com
 Booths: 107, 108, 122

Aquaculture Equipment

Sino-Aqua Corporation's main line of business is in the production and sale of paddlewheel aerators and other equipment and machinery for use in aquaculture. The company is also involved in the import and export of aquaculture species, seafood processing aside from carrying out turn-key service of aquaculture projects and general consultancies in aquaculture technology. It also does export of whole plant of feed manufacturing and seafood processing.

Sino-Aqua Corporation, 22F-2, No.110, Santuo 4th Road, Ling-Ya District, Kaohsiung 802, Taiwan
 Tel: +886 7 330 8868 Fax: +886 7 3301738/1739
 Web: sino-aqua.com
 Email: sales_dept@sino-aqua.com
 Booth: 123 & 138

Pioneer A.E. Co Ltd is in the field of aquaculture equipment. The company is backed by aquaculture, mechanical engineering and geo-technical specialists with over 13 years experiences. The major products & services include paddlewheel aerators ("teco" motor made under ISO9001/ISO14001), air-injectors, automatic feeders, rings/roots blowers (ISO9001), and water pumps (ISO9002). It also markets automatic grits manufacturing machines, mixer machines, fish chopping machines, fish mincing machines, HDPE pond liners (ISO9002), power control panels (ISO9001), electrical cables (ISO9001), farming systems & accessories and provides aquaculture consultancy services.

At the show, new products will be paddlewheel aerators. These have been developed to lower the costs of culture. The economical models are PA-111E (1HP, 2 Impellers) & PA-112E (2HP, 4 Impellers) paddlewheel aerators.

Pioneer A.E. Company Limited
 15F, 7, Ssu-Wei 4 Road, Ling-Ya District, Kaohsiung 802, Taiwan
 Tel: +88 6 7537 0017 ~ 8; Fax: +88 6 7 537 0016
 Web: www.pioneer-tw.com
 Contact: Sunny Wang, General Manager, Email: pioneers@seed.net.tw
 Booth No: 232

Health



INTERVET has announced that its first dedicated Asian-Pacific vaccines, developed at Intervet Norbio Singapore, will begin to roll out in 2005. Norvax® Strep *Si* is a monovalent vaccine containing inactivated strains of *Streptococcus iniae*. The vaccine induces protective immunity in tropical fish of both marine and freshwater environments against streptococcosis caused by *Streptococcus iniae*. *Streptococcosis* is one of the most serious diseases of tropical fish where cumulative mortality can be as high as 70%. Norvax® Strep *Si* has proven high and long-lasting protection and is safe for the fish, the vaccinator and the consumer.

To service the yellowtail, amberjack and red seabream industries, Intervet will introduce its first Japanese vaccine this year, Norvax® MonoVibriose, which will be followed over the next few years by a series of multivalent adjuvanted injection vaccines.

Intervet Norbio Singapore, its R&D centre in Singapore, was set up in 2000 entirely for the development of novel vaccines and other products for commercially farmed aquatic animal species in the Asia-Pacific region. Intervet is using the same level of technology and innovation for the development of Asian-targeted products as for its salmonid-targeted products. The company has the vision to know that the Asian aquaculture industry will adopt all the best that vaccination technology has to offer in the 21st century.

Intervet Norbio Singapore Pte. Ltd, 1 Perahu Road, Singapore 718847
 Tel: +65 6397 1121 Fax: +65 6397 1131
 Web: www.intervet.com/AAH/
 E-mail: info.aquaINS@intervet.com
 Contact person: Dr. Zilong Tan
 Email: Zilong.Tan@Intervet.com
 Booth: 209-210

Special Seminar on "Fish Vaccination in the Asia-Pacific Region"

Date: Wednesday, May 11, 2005

Time: 17.15 – 20.00hrs

Venue: to be notified

During the World Aquaculture, 2005 in Bali, Indonesia, Intervet will organise this seminar on "Fish Vaccination in the Asia-Pacific Region. Dr. Rohana Subasinghe, FAO, will speak on the sustainability of aquaculture in the region. Other experts will discuss

- Fish immunology and vaccination
- Vaccination in the salmon industry
- Fish diseases in Asia with a focus on the role of vaccination

Those interested in attending this seminar should email and fax giving full name and contact details by April 21 2005. Email: info.aquaINS@intervet.com or fax no. +65 6397 1131 (Please Mention: Vaccination).

AQUACULTURE



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- Global Aquaculture Alliance • International Associate of Aquaculture Economics and Management
- Indonesian Coral Shell and Ornamental Fish Association
- Indonesian Shrimp and Fish Farming Association
 - Indonesian Feed Milling Association
 - Indonesian Pearl Culture Association
 - Indonesian Seaweed Association
- Indonesian Ornamental Fish Exporter Association
- Indonesian Koi Hobbyist Association
- Indonesian Shrimp Feed Association
- Indonesian Tuna Association
- The Frozen Seafood Exporter & Producer Association of Indonesia
- Indonesian Fisheries Scientist Association
- Indonesian Fisheries Student Association



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YSI Donates to Indonesian fish farmers

Together with the World Aquaculture Society, US based YSI Incorporated, an employee-owned company has announced the "Fund for Rebuilding Aquaculture in Tsunami-Affected Areas". YSI has pledged \$50,000 plus equipment to the fund. The company is also encouraging other companies and organisations to participate in this international fund raising effort.

In their press release, YSI and WAS said that while there have been many donations to general aid agencies, they wanted to do something specifically for rural, small-scale aquaculture operations and aquaculture education facilities. Soon after the natural disaster on Dec. 26, 2004, YSI approached World Aquaculture Society (WAS) about raising funds.

Together the two organizations are spearheading a large-scale project to help after the first wave of aid, as people continue to put their lives and their jobs back together. They will work with existing agencies, such as Aquaculture without Frontiers and Network of Aquaculture Centres in Asia-Pacific (NACA), to identify projects, disburse the funds, and follow-up.

"I'd like the aquaculture and water monitoring industries to seriously consider joining us in helping Indonesian fish farmers regain their livelihood and restore a much needed protein source to the local population," said Gayle Rominger, senior vice president of YSI. "The fishing and aquaculture industries in tsunami-affected areas have been devastated."

All donations to the Fund will be channelled directly to Indonesia and other affected countries with the specific objective to help rebuild their damaged aquaculture communities. On line donations can be made through WAS at www.was.org or mail cheques to the YSI Foundation and sent to 1700/1725 Brannum Lane, Yellow Springs, Ohio, 45387, Attn: Mary Alice Waggoner, YSI Foundation Treasurer. Email: mawaggoner@ysi.com.

Aquaculture without Frontiers

– alleviating poverty in developing countries through responsible aquaculture

In its latest newsletter, Michael New, OBE, Chairman said that AwF has a volunteer ready to visit the Indonesian province of Aceh to make an assessment of the practical and immediate needs of small-scale farmers whose livelihoods have been devastated by the tsunami. Funds already pledged to AwF will be used for this mission.

This will provide the basis for requesting funds from the Tsunami Relief Fund set up by the World Aquaculture Society. Currently, the possibility of collaborating with the Network of Aquaculture Centres in Asia and the Pacific (NACA) for this purpose is being investigated and the Indonesian government authorities have been approached.

AwF has volunteers ready to provide technical expertise to assist in the alleviation of poverty in developing or transition countries through small-scale aquaculture. So far the funds available to us for this purpose are very limited. Despite this fact, AwF would like to solicit proposals for limited support. If you (or your existing project) could use the short-term services of an AwF volunteer to assist small-scale aquaculture in your area, please contact Michael New, providing brief initial details of your request. AwF is presently only able to consider the provision of volunteer assistance costing up to USD 2,000-3,000. It is also interested in collaborating with existing international NGOs working in poverty alleviation that wish to extend their existing aquaculture activities or to broaden their current aid portfolio.

More details: Email: Michael_New@compuserve.com; Web: www.aquaculturewithoutfrontiers.org

New appointments for Alltech Aqua

Alltech Aqua, the aquaculture division of Alltech Inc., continues to grow its team in the Asia Pacific region. In Indonesia, Haris Muhtadi recently joined as Technical Sales Manager – Aquaculture Farm Sector. Haris has over 15 years experience in the shrimp industry in Indonesia and brings a wealth of knowledge to the Alltech Aqua team. He will be working to develop the aquafeed and farm business for Alltech's products in Indonesia, working closely with the local Alltech office to support Alltech's



Haris Muhtadi

customers, and with the rest of the regional team headed by David Faulkner and Dan Fegan.

Phan Le Phuong has joined the Alltech Aqua team in Vietnam. Similar to Haris, he has a long experience in the shrimp industry, especially in marketing of feed additives and specialized farm products in Vietnam. He will work with Thien Le and Tho Nguyen in the Alltech Vietnam office to support Alltech customers in the feed and farm sectors.



Phan Le Phuong

MAS (Modern Aeration Systems) for grow out ponds

These are sub-surface diffused aeration systems for production ponds, developed by AREA, USA more than 33 years ago. The company continues to fine tune the system.

Jason E. Mulvihill, President said, "In aquaculture, aeration should maintain the desired oxygen level for the maximum period of time during the rearing cycle but minimize interference with daily operations such as feeding, sampling, etc. At the same time it should have low operating horsepower per hectare of pond and low capital cost. It should also have the capability to be operated by electric or gas or diesel".

The company has the options of two primary systems. The first is the 4 x 6 Suspended Diffuser Grids for ponds of less than 5 acres or less (<2ha). These have 4-6" (approx.10-15 cm) fused alumina diffusers and are recommended in small ponds or nursery units where oxygen fluctuations generally occur in a shorter time frame. The high diffusion capabilities of the diffusers stabilise oxygen levels. They also feature an extended period of time in the pond before cleaning is necessary but when necessary, this can be done using muriatic (HCl) acid and/or chlorine.

The second is a combination of the 4 x 6 Suspended Diffuser Grids with Airlift Pods for ponds greater than 5 acres or (>2ha). The Airlift Pod is designed to pump 660 gpm (approx. 50l/sec) each with air as the driving force. Depending on the amount of air injected into the units, they may pump up to approximately 1,200 gpm (approx. 90l/sec) each. Thus it does not only destratify, but also aerate.

According to the company, it is also important that the aeration device is not in contact with the bottom where it will most likely suspend the solids off the bottom. The impact of this is a short-term increase in the bacterial population to decompose. Thus, all MAS systems have been designed to be used at least 6 inches (15cm) above the pond bottom.

All systems operate off Rotron Regenerative Blowers which keeps capital costs to a minimum (basically half the cost of other systems), operating cost to a minimum due to low operating horsepower (average half the operating HP of any other system, no oil in the water as blowers are oil-free source of air, easy management flexibility due to valves being on each supply line allowing for air to be diverted to ponds with low oxygen levels, and no electricity near water.

More information: AREA at +1 305 248 4205, Email: info@areainc.com, Web: areainc.com

Larger and cheaper deep sea cages

Malaysian Olefins S/B is marketing new products in the ETER series of flexible deep sea floating cages. These are larger in size but cheaper in construction costs at USD 2,800 for a 400m² structure. Some cages have been installed in the South China Sea off the coast of South China. They are available in blue or black.

Hooi Y-W, General Manager, said that "Some of these cages installed in China have been well accepted by farmers. They have been tested for almost a year and are cheaper in construction cost compare to other models of deep sea cages currently available in the market. This new series has better anti-storm feature and flexibility in the whole cage."

According to the company, their cages are environmentally friendly, UV and sunlight resistance, rust and rot free with non toxic thick walls and are long lasting. Some of these cages have been set up in Brunei, Vietnam, New Zealand, Indonesia, China and Papua New Guinea where they are used for aquaculture in various water bodies such as in ponds, rivers and protected opens seas.

Malaysian Olefins was established in 1982. It is a pioneer in the plastic moulding industry and started with the fabrication of polyethylene (PE) plastic tanks. In 1999, the company introduced a range of cages for coastal and inland aquaculture. In 2004, it launched the fourth generation of PE floating cages which are available in various walkway combinations.

More information: Malaysian Olefins S/B, Tel: +603 5633 5999, Fax: +603 5635 0995/5635 4718; email: enquiry@malaysianolefins.com Web: www.malaysianolefins.com



Cages installed in Brunei

ASIAN AQUAFEEDS 2005

12th & 13th April 2005, Kuala Lumpur, Malaysia

This 2-day seminar, organized by the Malaysian Fisheries Society will bring together the aquafeed industry in Asia to discuss the latest available technologies and review challenges facing the industry for a sustainable growth. The timing of this seminar is appropriate as Asian feed manufacturers are expanding operations to meet the demand of markets especially those in Vietnam, Thailand and India.

The target audience includes aquafeed producers, nutritionists, feed mill operators, feed milling and processing equipment suppliers, feed ingredient suppliers, as well as researchers, aquaculture producers and policy makers. To date the organizers have lined up a list of speakers, from within and outside Asia.

Dr. A. Victor Suresh will look at the concepts related to nutrient delivery to shrimp. Formulators need to take into account the nutritional contribution of natural productivity of aquaculture systems and the fact that nutrient losses occur before and during feed intake by aquatic animals. He will look at the practical constraints to limiting nutrient leaching and how to accelerate feed search and intake.



Dr. Jacques Gabaudan will discuss the importance of product formulation and micro-ingredients for aqua feed as these must resist prolonged contact with possibly aggressive components in premix concentrates. As the aqua nutritionist needs to be well informed on the major characteristics of micro-nutrients

in order to select the best product for a given application, he will review formulation techniques and simple tests to evaluate the quality of formulated micro-ingredients.

Dan Fegan will discuss the need of traceability in aquafeed for the Asian industry. He says that feed producers in Europe and the USA are already complying so as to have greater transparency and traceability in the way they formulate and manufacture feeds. Soon, for Asian producers this may be unavoidable as the level of scrutiny on culture practices has been increasing in recent years.



In the session on manufacturing, Patrice Breillot of Clextal, France will discuss the technical and process information relevant to the aquafeed producers such as: extruder configuration, effect of extrusion parameters on feed characteristics and twin screw extrusion versus single screw extrusion.

Dr S. Vasudevan will discuss developments in the aquafeed industry in India whilst Dr Le Thanh Hung will look at the fast pace of development in Vietnam. They will also provide some estimates on the current and future demand for specific feeds.

Tentative Program for ASIAN AQUAFEEDS 2005

Date: April 12th & 13th, 2005

Venue: Pan Pacific Hotel, Kuala Lumpur, Malaysia

Formulation & Nutrition

- Nutrient requirements, formulation and feeding management ~ Dr. Sena DeSilva, Deakin University, Australia
- Nutrient delivery: concepts for consideration in aquafeed formulation ~ Dr. Victor Suresh, Consultant, India
- Micro-Ingredients For Aqua Feeds: The Importance of Product Formulation ~ Dr. Jacques Gabaudan, DSM Nutritional Products, Thailand

Raw Material Selection

- Use of non-marine animal protein meal in aquafeeds ~ Dr. Yu Yu, NRA, Hong Kong
- Understanding grain protein resources to optimise their application in aquaculture feeds ~ Dr. Brett Glencross, DOF, Australia
- Palm oil: Malaysia's gift to the global aquafeed industry ~ Dr Wing-Keong Ng, USM, Malaysia

Quality Control & Product Development

- Traceability in Asian Aquafeeds: should we be concerned ~ Dan Fegan, Alltech Inc., Thailand
- Development of larval feeds ~ Stretting-Nutreco, Tasmania, Australia
- Twin screw extrusion technology: control of the process parameters to optimize aquatic feeds ~ Mr. Patrice Breillot, Clextal, France
- Preservation of feed quality ~ Dr Kok-Leong Wee, Kemin, Singapore

Aquafeed Industry in Asia

- Establishing, building and sustaining an Asian Aquafeed Network ~ Pedro Bueno, NACA, Thailand
- Recent trends in the aquafeed industry in Asia ~ Dr. Zuridah Merican, Malaysia
- Aquafeed industry in India ~ Dr. S. Vasudevan, Consultant, India
- Aquafeed industry in Vietnam ~ Dr Le Thanh Hung, University of Agriculture and Forestry, Vietnam

More information: MFS, Tel: +603-8946 8288, Fax: +603-8948 8246, Email: annie@putra.upm.edu.my; anniechr@yahoo.com; wkng@usm.my; ngwingk@yahoo.com. Updates on the Web: www.vet.upm.edu.my/~mfs/

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

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As an aquafeed producer, feed ingredient and equipment or provider of diagnostic health services, you will need to know your market well. You have information on products and on your company that you want the reader to be aware of. Send these in (in less than 100 words) and we will help you free of charge.

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

NEWS

Years of lost opportunities for Philippine fry producers

Pat and shrimp producers in the Philippines are losing millions of pesos in potential revenues because of the government's long-standing ban on exports of fry.

The ban on exports of fry has been in place since 1997. It was intended to protect the local market from foreign competition. However, it has also prevented Philippine fry producers from expanding their markets and increasing their revenues. The ban has also led to a loss of technology and know-how to other countries. The government has been reluctant to lift the ban, citing concerns over the health of the local industry. However, many experts believe that lifting the ban would be beneficial for the Philippine industry in the long run.

As a consequence of the ban, many fry producers in the Philippines have been forced to sell their fry at a lower price than they would have received if they were allowed to export. This has led to a significant loss of potential revenue for the industry. Additionally, the ban has prevented fry producers from accessing the latest technology and equipment available in other countries.

Producers are now looking for ways to circumvent the ban, such as exporting to neighboring countries. However, this is not a sustainable solution in the long run. The government needs to reconsider its policy and lift the ban on exports of fry to allow the Philippine industry to compete in the global market.

By [Author Name]

AQUAFEED

Nurturing industry

The shrimp feed market is expanding rapidly due to white shrimp culture. To gain a competitive edge, feed producers are increasing the degree of inclusion and laboratory services and using ingredients to supply disease-free or resistant products. A tight consensus of forward-looking feed ideas is the result for the Americas, China and Thailand in coming demand for fish feeds. News items include feed and shrimp feed products.

As the shrimp feed market continues to grow, feed producers are looking for ways to improve their products. This includes increasing the degree of inclusion of essential nutrients and using high-quality ingredients. Additionally, many feed producers are now offering laboratory services to their customers to help them optimize their feed formulations.

Shrimp feeds are also being developed to be more resistant to disease. This is achieved through the use of natural and synthetic antibiotics, as well as other disease-fighting ingredients. Feed producers are also looking for ways to improve the digestibility of their feeds to ensure that shrimp can get the most out of their feed.

Feed producers are also looking for ways to improve the sustainability of their feed production. This includes using locally sourced ingredients and reducing the environmental impact of their production processes. Additionally, many feed producers are now offering technical support to their customers to help them optimize their feed formulations.

As the shrimp feed market continues to grow, feed producers are looking for ways to improve their products. This includes increasing the degree of inclusion of essential nutrients and using high-quality ingredients. Additionally, many feed producers are now offering laboratory services to their customers to help them optimize their feed formulations.

By [Author Name]

PRODUCTION

MAS (Modern Aeration Systems) for grow out ponds

There are sub-surface aeration systems for production ponds, developed by MAS, USA more than 20 years ago. The concept continues to be the best system.

MAS (Modern Aeration Systems) are designed to provide efficient aeration for grow-out ponds. They consist of a series of diffusers that create fine bubbles, which rise through the water column and provide oxygen to the fish. This system is highly efficient and can be used in a variety of pond sizes and depths. Additionally, MAS systems are easy to install and maintain, making them a popular choice for many aquaculture operations.

These systems are also designed to be energy-efficient, which is an important consideration for many aquaculture operations. By using MAS systems, producers can reduce their energy costs and improve the overall profitability of their operation.

As the demand for high-quality aquaculture products continues to grow, producers are looking for ways to improve their production processes. Using MAS systems is one way to achieve this goal. By providing efficient aeration, MAS systems help to ensure that fish are healthy and growing at an optimal rate.

By [Author Name]

LARVAL FEEDING

Microdiets - A decisive replacement in the weaning of larval fish

Using an oil-free diet from fish, from an early stage of production can reduce production costs and risks. Furthermore, it can contribute to more consistent conditioning resulting in more productive production of fry and adults.

Microdiets are a type of specialized feed that is used to wean larval fish from their natural diet of zooplankton. They are formulated to provide all the essential nutrients that the fish need to grow and develop. Additionally, microdiets are often easier to digest than natural diets, which can help to reduce the risk of disease and improve the overall health of the fish.

Using microdiets can also help to reduce production costs by reducing the amount of natural diet that is needed. This is because microdiets are often more concentrated than natural diets, meaning that less feed is needed to provide the same amount of nutrients.

As the demand for high-quality aquaculture products continues to grow, producers are looking for ways to improve their production processes. Using microdiets is one way to achieve this goal. By providing a consistent and high-quality diet, microdiets help to ensure that fish are healthy and growing at an optimal rate.

By [Author Name]

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(see page 38)

9-13 May

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Contact: John Cooksey
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Email: worldaqua@aol.com
Web: www.was.org

26-29 May

Aquarama 2005
Singapore
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Tel: +65 6887 9316
Email: linda_tan@cmpasia.com.sg
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8-10 June

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Tel: +86-411 8480 9622
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Email: seafood@dxceczch.mail.sohu.net;
seafoodexpos@yahoo.com.cn
Web: seafoodexpos.com

14-16 June

Vietfish 2005
Ho Chi Minh City, Vietnam
Contact: Vo Thai Phong
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Fax: +84 8 511 0931
E-mail: vasesp-org@hcm.vnn.vn or
phongvt@vasesp.com.vn
Website: www.vietfish.com.vn

28-30 June

China Seafood Exposition
Shanghai, China
Contact: Pauline Chee
Tel: +65 6372 1379
Fax: +65 6222 7526
E-mail: pcdivcom@singnet.com.sg
Website: chinaseafoodshow.com

5-9 August

Aquaculture Europe 2005
Trondheim, Norway
Email: ae2005@aquaculture.cc
Web: www.easonline.org/agenda/en/Aqua
Euro2005/default.asp

5-9 September

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

25-28 October

6th Symposium on Diseases in Asian
Aquaculture (DAA VI)
Colombo, Sri Lanka
Contact: Melba Reantaso, FAO
Email: Melba.Reantaso@fao.org
(quote subject:DAA VI)
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2005

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**3rd Regional Grouper Hatchery Production Training Course
for the Asia-Pacific Marine Finfish Aquaculture Network,
18 April - 8 May, 2005.**

At its website, NACA has announced the above to be conducted at the Brackishwater Aquaculture Development Center in Situbondo (BADC-Situbondo), East Java, Indonesia. BADC-Situbondo has excellent facilities and practical experience in breeding and fingerling production of several grouper species, including *Cromileptes altivelis* (humpback grouper) and *Epinephelus fuscoguttatus* (tiger grouper). Field trips will also be made to the Research Institute for Mariculture Gondol, Bali and private hatcheries, nurseries, grow-out and live fish exporters in Bali in addition to the field trips in Situbondo.

Farmers, hatchery operators and technicians will benefit most from this practical hands-on course. Those who are interested to invest in grouper hatcheries, but have little or no aquaculture background will also find the practical course a good basis for their future investment decisions.

More information: Mr. Sih Yang Sim, email: grouper@enaca.org; web: www.enaca.org/marinefish



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