

MEETING REPORT

The Aquaculture Roundtable Series (TARS) *A shared vision for aquaculture in Asia*



AQUACULTURE FEEDS & NUTRITION August 17-18, 2011, Singapore

Close to 180 participants comprising nutritionists, feed formulators, aqua feed producers, integrators, feed equipment manufacturers, feed ingredients and feed additive suppliers from Asia, South America and Europe attended the inaugural Aquaculture Roundtable Series held in Singapore on August 17-18, 2011. Organized by Aqua Research PL, publisher of Aquaculture Asia Pacific (AAP) and Corporate Media Services PL, and supported by the Agri-Food & Veterinary Authority of Singapore (AVA), Wenger, Evonik, DSM, Alltech and Aquativ (sponsors), TARS 2011 provided an independent platform for discussions with stakeholders, experts and colleagues in the industry from Asia and around the world. It was organized to influence the industry into moving towards a more coordinated and technologically driven industry.

For this meeting, TARS focused on *Aquaculture Feeds and Nutrition*.

At the plenary session held on Day 1 with the theme “**Where Are We Today?**” experts in aquaculture technology and nutrition from the USA, Canada, Asia, and Europe addressed a range of topics that reviewed the current status of aquaculture feeds and nutrition; key issues, opportunities and challenges for aquaculture development in Asia; and strategies to advance this industry sector to the next level.

For information on the plenary session presentations, please refer to the TARS 2011 Conference Program Book.

REPORT ON BREAKOUT SESSIONS

The meeting incorporated a breakout session on Day 2. Participants were divided into 3 groups, namely:

- Shrimp Feeds
- Marine Fish Feeds
- Freshwater Fish Feeds

The Breakout Sessions focused on the theme “**Where Do We Want To Be Tomorrow?**” Led by team leaders, the groups addressed the following points:

- Identification of key challenges
- Identification of priority areas for improvement
- Recommended strategies.

A summary of the discussions for each of the three groups are highlighted in the next section.

SUMMARY OF ROUNDTABLE DISCUSSIONS

INDUSTRY GROUP:

FRESHWATER FISH FEEDS

PANEL DISCUSSION LEADER:

Dr Wing-Keong Ng, Professor, Fish Nutrition Laboratory, School of Biological Sciences, Universiti Sains Malaysia.

ROUNDTABLE LEADERS:

Thomas Wilson, Thai Luxe Feeds, Thailand; Pedro Encarnaçao, Biomin, Singapore; Laurent Genet, Skretting/Nutreco, Vietnam and Wee Kok Leong, Temasek Polytechnic, Singapore.

Key Challenges Identified

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| <ul style="list-style-type: none"> • Lack of digestibility data on indigenous and alternative feed ingredients. • Lack of nutrient requirement data for farmed fish, i.e. specific formulation for every single species. • No pelleted feed for larval stage, maturation and broodstock feeds. • No proper feed application and management protocol at farm level. • Fish cost remains the same despite high labour and energy cost. • Ingredient quality, variability and cost. • Low fillet yield for some fish species, e.g. tilapia. • Unbalanced feed ingredients/nutrients used in farm-made feeds. • Need for sustainable feeds that do not pollute the environment. • Traceability of raw materials. | <ul style="list-style-type: none"> • Special diet formulations for specific culture conditions – e.g. high-density culture. • Availability of raw materials. • Development of feeds for different life stages. • Seasonal feed adjustment – e.g. variation in water temperature. • Vegetarian diets. • Anti-nutritional factors in feed ingredients. • Disease threat. • Towards extruded diets. • Technical challenges in using enzymes and additives in extruded feeds, including water stability • Off-flavour in freshwater fish. • Water quality in cage farming in lakes and reservoirs. • Customer education. |
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Priority Areas for Improvement

Recommended Strategies

Field-based nutrient requirement data for established, emerging and improved strains of freshwater fish.

Establishment of coordinated and standard protocols for lab and field based feeding trials.

Comments:

- Research on nutrient requirement data should include field-based feeding trials as some requirement values are known to be influenced by various field culture conditions.

Establish public and private partnerships to finance and execute R & D.

Comments:

- A significant amount of R&D is undertaken by feed companies but the information is proprietary and remains unknown to the public.
- In some countries with lack of R&D funds, governments have passed the role to the feed companies.
- Support for R&D from public funds is required so that information is available freely. Often funds from public and private partnership are only used for selected high value fish.
- Research funded by private and public funds should be coordinated and standard protocols established.

Fishmeal and soybean meal replacement in freshwater fish feeds.

Quantifying anti-nutritional factors in alternative ingredients and establishing effective strategies to improve and increase usage. Effective use of feed additives to improve feed and health performance. Development of specialized feed manufacturing equipment suitable for novel feed additives.

	<p>Establishment of upper limits of alternative ingredients inclusion levels.</p> <p>Comments:</p> <ul style="list-style-type: none"> • The current challenge is to find cheap raw materials locally as prices of popular raw materials such as cassava and corn have escalated because of competition with ethanol production. • Extraction of the oil makes palm kernel meal unsuitable in fish feeds as the fibre content is much higher. • The variability in nutrient composition of soybean and other raw materials also poses a challenge. A survey of various feed ingredients and their nutritional impact was suggested. • Freshwater fish feed is formulated with large amounts of soybean meal. However, there is a need to recommend strategies, quantify and establish practices for improving its use. It is important to establish the upper limits of its use.
Digestibility data of alternative and indigenous feed ingredients.	Conduct ring test to establish reliable digestibility data for feed ingredients used in freshwater fish feeds.
Making and using “green” feeds.	<p>Establishment of nutrient discharge levels from freshwater farming operations.</p> <p>Comments:</p> <ul style="list-style-type: none"> • Establish nutrient discharge standards in the country, study effects of the discharge and formulated feeds should meet these discharge levels. In the long run, this will ensure sustainability of aquaculture operations and positive public perception of the industry.
Feed and feeding management.	<p>Development of species-specific feeding protocols.</p> <p>Comments:</p> <ul style="list-style-type: none"> • Formulation of good diets requires going back to basics. • Complete data on nutrient requirements for all the species is essential. • Feeds for polyculture systems are important in Asian aquaculture. It is the responsibility of feed producers to closely be involved with the farmer and study the impact of feeds on water quality. <p>Education of farmers.</p> <p>Comments:</p> <ul style="list-style-type: none"> • The low interest in high performance feeds is due to the lack of education and information on nutrition and ingredients. <p>Focus on improving cost of feeding (\$/kg fish produced).</p> <p>Comments:</p> <ul style="list-style-type: none"> • Low cost feeds are required but farmers need to understand proper feed management. <p>Use of feeds for specific life stage.</p> <p>Comments:</p> <ul style="list-style-type: none"> • Too many feed standards tightly regulate the industry. • Specifications have been based on published requirements based on laboratory trials. • Usually, these do not allow for changes based on new information from commercial field trials and changes in culture conditions/systems. • For example, tilapia has undergone selective genetic improvement and nutrition should match genetic changes.
Managing disease through functional feeds.	Clarification on use and function of additives such as prebiotics, probiotics, organic acids, nucleotides.
Improve water quality through good feed quality and management in lakes and reservoirs; maximize benefits from natural feeds.	<p>Extruded vs. pelleted feeds.</p> <p>Comments:</p> <ul style="list-style-type: none"> • Extruded feeds can be visually observed since they float and can promote better FCR.

<p>Improve cost effectiveness of feeds, e.g. use of animal byproducts and DDGS.</p>	<p>Feed quality is more important than feed cost considering total cost of production.</p> <p>Comments:</p> <ul style="list-style-type: none">• Feed specifications based on protein and fat levels allow feed companies to present a range of 5-6 types of feeds formulated with different raw materials to match prices demanded by farmers.• As such, there has to be a compromise in nutrition on what can be achieved and on what the farmer needs. It is the responsibility of feed companies to self-regulate.
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For report on Marine Fish Feeds, cont'd next pg.

INDUSTRY GROUP:**MARINE FISH FEEDS****PANEL DISCUSSION LEADER:**

Dr Shunsuke Koshio, Professor, Faculty of Fisheries,
Kagoshima University, Japan.

ROUNDTABLE LEADERS:

Serge Corneillie, Alltech Japan; Niels Alsted, BioMar Group
A/S, Denmark; Mian Riaz, Texas A&M University, USA; and
Dominique Bureau, UG/OMNR Fish Nutrition Research
Laboratory, University of Guelph, Canada

Key Challenges Identified	
<ul style="list-style-type: none"> • Improvement of larva and fingerling quality • Diseases in fry and fingerling • Cost effectiveness vs. quality of feeds • Dominance of generic feeds • Replacing fish meal and fish oil • High cost of feeds • Improvements in feed, reduce fines • Need to have feeds for fast grow-out and low FCR • Need to get the right feed at the right time • Lack of brood stock feeds • Awareness on risks of using trash fish • Dependence on trash fish and lack of complete nutrition, variable supply and unpredictable quality • Gap in nutritional requirements • Raw material limitations/more knowledge on use of ingredients • Lack of knowledge in extruded feed: characteristics, palatability, texture 	<ul style="list-style-type: none"> • High cost of ingredients and variability in ingredients • High cost of weaning diets • Few feed companies producing weaning feeds • Micro diets development • Lack of collaboration with R&D institutions and government • Education level of farmers/education in feed storage and handling • Sustainability of aquaculture industry • Biosecurity in farming • High risk business • Government support • Food safety • Credit

Priority Areas for Improvement	Recommended Strategies
Development of larval and fingerling diets.	Research of nutrition (larval and brood stock). Development of functional feeds. Development of experimental brood stock feeds.
Good hatchery practices / choice of species and development of broodstock.	Practice good culture management. Selection of broodstock. Comments: <ul style="list-style-type: none"> • High cost of R&D to maintain broodstock etc.
Understanding nutrition of species.	Research for better understanding of nutrition for each species to achieve complete formulation. Comments: <ul style="list-style-type: none"> • Many feed companies formulate generic feeds such as barramundi used to feed groupers. • Species-specific feeds are required.
Awareness of risk on utilization of trash fish and the provision of a clear conclusion. Improving productivity and profitability with better feeding practices and production management.	Regulation control, centrally-planned with input from production sector and research institutions. Comments: <ul style="list-style-type: none"> • Regulation in terms of discharge control. • Government and industry to work together to set some standards for improvements. Use of compound feed instead of trash fish. Comments: <ul style="list-style-type: none"> • Educate farmers on the use of compound feeds. • To move forward, documentation on the value of compound feeds is a necessity for users of trash fish.

	<ul style="list-style-type: none"> • Often farmers require very clear conclusions on the difference between trash fish and compound feeds. • The issue is complicated as farmers see the quick consumption of trash fish. • Farmers need to see the high cost of losses with diseases. <p>Comparative approach in farms.</p> <p>Comments:</p> <ul style="list-style-type: none"> • Some examples to demonstrate the benefits of dry pellets to farmers include feed company demonstration farms and in China, where a research centre is next to farmers' cages.
Suitable feed type for specific life stage of fish culture.	Nutritional research to get more data. Comparative approach in the farms.
Search for new ingredients and attractants. Determination of inclusion level and control of raw material quality.	Utilization of recycled products. Research on new materials. Land-based materials (Europe and Japan) Comments: <ul style="list-style-type: none"> • Japan has restrictions on the use of land-based raw materials.
Understanding of amino acid (AA) requirements.	Emphasis on research on AA requirements. Control of local raw materials. Search for amino acid sources.
Traceability and transparency of food production and food safety issues.	Improve monitoring, supply and certification. Comments: <ul style="list-style-type: none"> • Food safety is a vital specification, especially for premium prices.
Feed quality suitable to specific species and cost reduction.	Improve producer education and training. Improve feed quality with addition of feed additives for disease resistance.
Manufacturing and management in feed production.	Improve product quality.
Reduce practice of long-term storage that can lead to disintegration and loss of nutritional quality of feeds.	Educate farmers on storage and handling. Comments: <ul style="list-style-type: none"> • Farmers face the challenge of getting the right feed (with the right quality and physical characteristics) and at the right time. • There could be the lack of critical mass to get the right type of feed at the right time.
Training of professionals for extension programme.	Partnerships, improving communications and working relationship between research institutions and industry stakeholders. Comments: <ul style="list-style-type: none"> • Create a research environment where feed and feed additive companies and universities can work together. • Research by universities become relevant to industry and those by feed additive companies are objective. • Train researchers/technical staff on business to enhance skills for running successful aquaculture businesses. • The concept of combining technical knowledge with a MBA degree is worth considering. • Vocational training must not be neglected.

For report on Shrimp Feeds, cont'd next pg.

INDUSTRY GROUP:**SHRIMP FEEDS****PANEL DISCUSSION LEADER:**

Daniel Fegan, Regional Technical Manager, Cargill Animal Nutrition, Cargill Siam, Bangkok, Thailand

ROUNDTABLE LEADERS:

Victor Suresh, IAI, Brunei; Joseph P Kearns, Wenger, USA; Jacques Gabaudan, DSM, Thailand; Craig Browdy, Novus Aqua, USA; and Albert G. Tacon, Aquatic Farms, USA.

Key Challenges Identified

- Fishmeal replacement
- New protein sources
- Ingredient pre-treatment; fermentation, hydrolysis, biodegradation
- Keeping costs stable
- Gaps in nutrient requirement and digestibility data
- Enhancement of formulation flexibility via new approaches
- Regulatory constraints; ingredient traceability, ethoxyquin, aflatoxin limits, outdated constraints
- Manufacturing technology limits on enzymes, probiotics and leaching
- Farmer education on diversity of systems, feed selection and general technical knowledge

Priority Areas for Improvement**Recommended Strategies**

Nutrient requirements and digestibility.

Standardized research methods.

Comments:

- Scientific rigour is required. Compared to poultry, shrimp nutritional studies often have little replication.
- Should work done in clear water tanks systems be applied to pond conditions? A suggestion is to use pond water in laboratory trials.
- Negative results are important if they are explained to show trends or when the wrong parameters are used.
- Standardization may erode originality of research.

Sharing of information.

Comments:

- Industry is fragmented; more interaction with government is recommended. For example, difference in levels of protein and fats in feed specifications can prevent feed companies from producing more efficient feeds.
- Flexibility in feed specifications as feed formulation is evolving with changing ingredients.

Impact of natural productivity.

Local/new ingredient characterization.

'Functional' ingredients.

Leaching.

Regulatory/Certification.

Interaction with government certifiers.

Comments:

- It is critical for the industry to engage itself in any standard setting process
- Poor response at certification dialogues such as with the WWF Shrimp Aquaculture Dialogue can result in standards that are difficult for shrimp producers to comply and have an impact on the feed industry.

Set up an Industry Association to share views/information.

Comments:

- An Asian Aquafeed Manufacturing Association to work together on non-competitive issues such as regulations. This will promote uniformity and raise the bar in terms of quality standards. It will also help to give a positive image for aquaculture.
- The role is also educational and to help governments to prioritize research and improve research capacity.

	<ul style="list-style-type: none"> Producers should not compete with each other but instead see the benefits of cooperation. <p>Improve communication.</p> <p>Comments:</p> <ul style="list-style-type: none"> A multidisciplinary collaboration between feed suppliers, additive and feed equipment companies to match all requirements is key to delivering good products <p>Establish funding mechanisms.</p> <p>Comments:</p> <ul style="list-style-type: none"> There is an aqua internship program with industry run by AIT – an academic certificate is no longer sufficient. Need to encourage young people to work in aquaculture.
Culture systems.	<p>Establish standards for given systems.</p> <p>Develop better feed/feed management strategies.</p> <p>Comments:</p> <ul style="list-style-type: none"> There is already an extensive database (built over 30 years) on feeds for the vannamei shrimp. Improving the availability and accessibility of this information can benefit the industry greatly. With the lack of information available, should farmers using auto feeders gauge the best feeding frequency via trial and error? Farmers have a thin bottom line and cannot afford mistakes. Feeding rate recommendations are still based on monodon shrimp. There should be more work on feeding dynamics. Should we focus feeding rate on biomass instead of stocking density? Cost of feeding should be based on feed per kg. Acoustic technology was suggested to determine feeding frequency.
Cost/Benefits of nutrition.	<p>Credible independent research on supplements/additives needed.</p> <p>More interaction between academia and feed manufacturers to meet/understand commercial challenges.</p> <p>Comments:</p> <ul style="list-style-type: none"> Feed equipment companies want to interact with industry to develop complete feeds with novel ingredients.
Farmer education.	<p>Public/private sector collaboration needed.</p> <p>Improve knowledge and technology transfer.</p> <p>Comments:</p> <ul style="list-style-type: none"> Thailand has been very successful with academia-government - private sector partnerships in terms of disseminating correct information to farmers.
Manufacturing technology.	<p>Multidisciplinary collaboration between all stakeholders.</p> <p>Increase ability to use novel approaches/ingredients.</p>