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The Nutritious Pond Project

Newsletter #2, April 2016

What happened in the last few weeks?

- In February, Marc and Olivier when to Ho Chi Minh City and the Mekong Delta to meet with project partners and visit potential sites for on-farm experiments.
- Devi and Kabir started to yield some results from on station and lab experiments.

Visit in the Mekong Delta

In Ho Chi Minh City, we met with different International NGOs to present the concept of the Nutritious pond project. The Nutritious pond concept raised the interest of NGOs such as SNV, WWF and IUCN as the concept can be applied to extensive system and integrated mangrove shrimp system to improve their productivity.

Can Tho University research facilities

The visit in Can Tho started with the visit of **College of Aquaculture and Fisheries** (CAF) facilities. Recently, CAF acquired a raceway designed as recirculating system to support experiments for future research and used as demonstration site for local fish farmers.

CAF is also conducting research on biofloc system, using *P. vannamei* as model, and looking at the effect of different light intensity on biofloc systems composition and its effect on shrimp growth. CAF facilities would be a perfect site for future experiments of the Nutritious pond project on algae : bacteria interactions



Vemedim research facilities

Dr Vo Van Song gave a tour of the Vemedim research facilities to present the newly established research center in Can Tho town where Vemedim products are analyzed. The facilities include a microbiology unit to screen and select bacteria for future pro-biotic products.



Vemedim also operates a research station in O'Mon, about 25 km north Can Tho, where products are tested in situ. The research station includes several freshwater and brackish water ponds. The small size brackish water ponds (100m²) are available and would be ideal for Nutritious pond experiments.



Field Visits

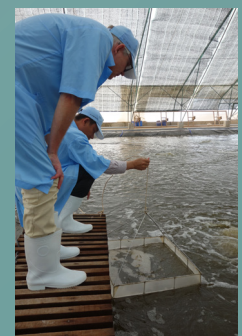
The Nutritious pond project team visited several farms in Soc Trang and Bac Lieu provinces. Those farms are potential partners in research.

First, we visited Mr Luong's farm. The farm is located north of the My Tanh river estuarine, along the mangrove belt. The farm is composed of 16 lined ponds (2,000m²) used for intensive *P. vannamei* culture (125 PL/m²), with intensive aeration system to keep the biofloc in suspension.



Members of the My Thanh association are raising shrimp in intensive systems (>100 PL/m²) in large ponds (3,000 to 7,500 m²) without liner. My Thanh farmers association faced several severe disease outbreaks in past years and are interested in new approaches such as the Nutritious Pond concept which could help them to reduce their operational cost.

Finally we visited Viet Uc Cie farm in Bac Lieu. Viet Uc is a Vietnamese – Australian company operating 4 farms in Vietnam where they apply a super intensive *P. vannamei* system in greenhouses. In those farms, 1 ha can produce between 40 to 60 tons per crop, with 2.5 crops per year at a stocking density between 350-500 PL/m². Viet Uc is interested in the Nutritious Pond concept initiative and works in close collaboration with Can Tho University. Their technical expertise and knowledge of shrimp farming in the Mekong Delta is most welcome in the Innovation Platform.



Stakeholder workshop in Can Tho

On the 22nd of February, CAF held the first Nutritious Pond stakeholder meeting. The meeting included 21 participants from Can Tho University, Skretting Vietnam, CAF CTU, My Thanh shrimp farmer association representatives, Mr Luong (farmer), the Department of Agriculture and Rural Development from Soc Trang and Bac Lieu provinces, Vemedia representatives, Viet Uc Cie representatives and Wageningen University representatives.



The meeting was the opportunity to present the project past and current activities and the Nutritious Pond concept to all the participants. The participants shared ideas and questions around technical aspects of the project. The discussion was around the first experimental design and the use of additional carbohydrate in the feed composition to increase the C:N ratio. Then participants discussed the type of production system where we should test this new type of feed. The stakeholders concluded that the first trials should be aimed at 3 main types of production system: Intensive (200-300 PL/m²) and semi-intensive (25-30 PL/m²) *P. vannamei* systems in Soc Trang and an improved extensive system (5 PL/m²) for *P. monodon*, a very common system found in Bac Lieu and Ca Mau province.

Based on this discussion, Wageningen University, CAF and Skretting started to design a new feeding protocol that includes additional carbohydrate made of rice bran and cassava.

The meeting was also the opportunity to present the future innovation platform to the stakeholders. The initiation of the innovation platform is planned in May in synergy with the start of the farm trials. In addition, Wageningen University in collaboration with Can Tho University will organize a *Rapid Appraisal of Aquaculture Innovation System (RAAIS)*, with a series of in-depth interviews with different key stakeholders of the shrimp aquaculture sector and a workshop to identify enablers and barriers to innovation in aquaculture.

We discussed the opportunity to discuss and list potential stakeholders to interview and invite for the RAAIS workshop. Those trials will be the basis of the interactive reflexive design approach supported by the Innovation Platform. College of Aquaculture and Fisheries of Can Tho University will have a central role in the project, supporting the communication between stakeholders and centralising the information and knowledge acquired during the farm trials.

Future activities in Vietnam

- Mr Tran Nguyen Duy Khoa from College of Aquaculture and Fisheries in Can Tho University is recruited as assistant to the Nutritious Pond project in Can Tho to support research activities.

- Tran Huu Tinh will return to Can Tho University in May 2016 to start his PhD experiments.
- Finalize the design of experiment and start first experiment in farms by May 2016
- *Rapid Appraisal of Aquaculture Innovation System (RAAIS)* and in-depth interviews with different key stakeholders of the shrimp aquaculture sector in May 2016
- Initiation of the Innovation platform

Research activities

Devi Hermsen, The Netherlands



The main focus of Devi's PhD-project is to get insight in the natural production of essential fatty acids by algae in the pond, and the utilization of this natural food source by the shrimp.

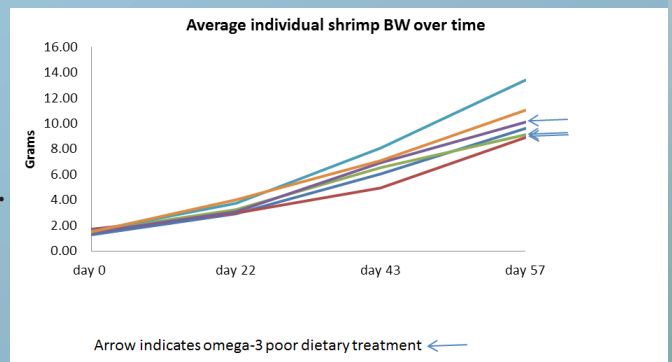
The overall hypothesis: by increasing the omega-3 content of the pond's algae, the quality of natural live food in the pond will be boosted (algae, biofloc, zooplankton, etc). As a result of enhanced natural food quality, the shrimp will increase their intake of natural food resources, making the shrimp industry less dependent on expensive and scarce feed ingredients used in commercial pelleted diets.

Status Update

Devi's first experiment finished this month. The effect of excluding omega-3 fatty acids from commercial shrimp feed was investigated. Two dietary treatment groups were designated, both consisting of 3 replicates with each 60 shrimp in a closed green water mesocosm system resembling a shrimp pond.

The feeding trial lasted 2 months. The first group received a standard commercial diet including essential omega-3 fatty acids, and the second group received a diet without omega-3 fatty acids where fish oil was replaced with coconut oil and casein. All diets were similar in energy, protein, crude fat and amino acid content.

Although omega-3 fatty acid is essential for shrimp growth, it was hypothesized that shrimp performance would not be affected due to the availability of omega-3 fatty acids in natural food present in the mesocosm tanks.



From first impression no significant differences were observed in survival and growth of the shrimp. Right now Devi is working in the lab to get information about the omega-3 content and distribution in the shrimp tissue and in the natural food resources.

In the meantime Devi is starting up experiment 2 where she will investigate the effect of nitrogen and/or phosphorous limitation on omega-3 production and distribution in the pond, and the utilization of natural food by the shrimp. This experiment will run from April until May 2016.



Kabir Ahmed Kazi, Bangladesh



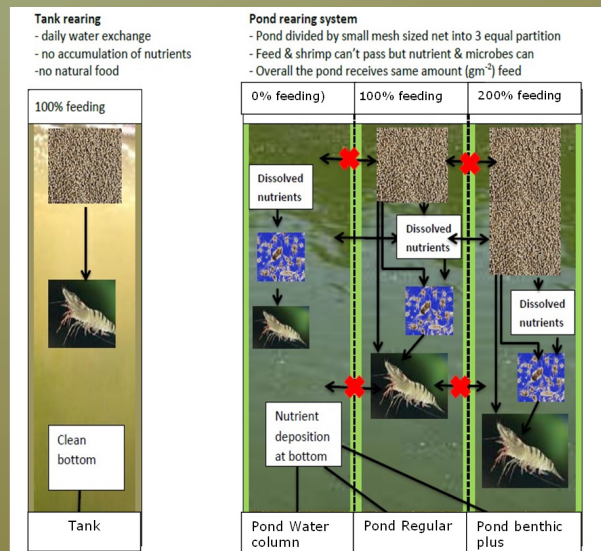
The central hypothesis of this research is that the dietary requirements of shrimp are influenced by culture system and culture intensity. In outdoor ponds, nutrients in formulated feed can be eaten by the shrimp directly or indirectly, the latter by eating biota present in the water column or benthic community which incorporated waste nutrients. An integration of outdoor compartmentalized ponds and indoor tanks was designed to quantify the contribution of different routes (directly eaten, water column or benthic) to shrimp production in ponds.

From the feed composition point of view it was assumed that DP:DE, fat:carbohydrate and NSP:starch ratio of a diet has major influences on the above mentioned feeding routes. A preliminary experiment was executed using two diets differing in DP:DE ratio and three feeding levels: 0, 45 and 90% of recommended intensive feeding level.

The feeding routes were tested outdoor and indoor over a two months period, at a stocking of 20 juvenile shrimp m^{-2} .

The DP:DE ratio of the diets did not affect growth and survival, except that calcium deposition was better with the high DP:DE ratio diet. In ponds, shrimp growth and survival was similar for the 45% and 90% feeding levels, and were better than with the 0% feeding level in terms of individual growth.

Among the 45% and 90% feeding level survival, individual growth and biomass growth was better in 45% feeding in both ponds and tanks. Concentrations of chlorophyll a, phytoplankton, zooplankton, benthos and total bacterial count in both water column and sediment declined gradually between the start and end of the experiment.



The unexpected low response to changes in the DP:DE ratio might have been caused by a reduction in salinity due to heavy rain from 5 ppt at the start to 1 ppt at the end of the experiment. Measurements of gut fullness showed the shrimp consumed feed and natural food. Availability of the latter through the water and benthic routes declined with increase in shrimp biomass in the system.

In spite of high consumption, the energy intake might have been too low for osmoregulation at these low salinity rearing conditions, limiting feed utilization efficiency. *P. monodon* is known to perform best at salinities above 20 ppt. Additional information from a follow up experiment executed at a salinity > 20 ppt is needed to fully explain experimental results.