

## Philippines

Farmer to Farmer - Sustainable Aquaculture Niche Project with Aquaculture without Frontiers

November/December 2010

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### Black Tiger Prawn Production

After the devastation of the Philippine black tiger prawn industry in the '90s, due primarily to *luminous* bacteria, the industry was on its knees, producing a small fraction of what it did in its heyday. Regional shrimp producers such as Thailand shifted entirely out of black tigers and into whites over the past six years. An effort was made to push the Philippines in that direction, and there are some whites now produced in Luzon, though marketed, generally, only locally.

Some growers saw this larger regional trend toward whites as an opportunity: with much fewer black tigers on the market, and a solid demand for larger prawns already established, prices would remain high for the large (40 gram) prawns.

White Spot disease reared its ugly head in the black tiger industry though, and threatened production again. A few of the farmers took on this challenge, and are winning.

The name of the game now is *Biosecurity*. The farmers/managers agree that White Spot can be effectively managed with comprehensive measures in place to intercept all horizontal disease vectors, known, perceived and unknown. These include:

- 1) Allocation of a significant portion of the farm's ponds for a reservoir system to treat the incoming water. The water is initially pumped through an 80 um screen, and allowed to settle for up to seven days. It is then pumped through a 200 um screen into another pond, where it is disinfected before being pumped through another 200 um screen to the grow-out ponds. There it is 'cultured' with appropriate algal and bacterial species prior to stocking with PLs.
- 2) Two layers of bird netting are placed over the entire farm to eliminate any possibility of an avian disease vector.
- 3) The farm itself is isolated from the immediate outside environment by a series of fences and canals. The fences, buried into the ground, are fine mesh to resist crabs and aquatic mammals. There is such a fence screen on the outside of the farm, and another on the inside, along the pond dikes. The incoming farm road and a parallel, adjacent canal are either in-between or outside the two fences.
- 4) Entry into the farm is highly restricted. Generally, visitors are not welcome. If a vehicle is allowed entry, its tires are sprayed with disinfectant.

- 5) Once on the farm, everyone wears rubber boots, which are disinfected daily. When entering the pond area from the storage and parking areas, one has to step through a series of disinfectant foot baths.
- 6) The PLs are sampled for White Spot prior to stocking, and if positive, the PLs are rejected.
- 7) When sampling prawns with a cast net, the net is often disinfected after each throw, and there is especially great care to disinfect the net between each pond use.
- 8) The prawns are handled as little as possible.
- 9) The water is managed as a semi-closed system, with new water added only to make up for seepage and evaporation in the early and mid-growth stages. This water is treated the same as the initial fill water, staged through screens, settled, and disinfected.
- 10) Stocking and management is semi-intensive to intensive, with stocking rates of 20 PLs per square meter utilized.
- 11) Feed is imported, primarily from CP in Thailand.
- 12) Specific probiotics are utilized for pH adjustment, ammonia reduction and elimination of *luminous* bacteria.

The results? Consistent production of 6-8 tons per hectare in 120 days or so. Disease prevalence? Nearly zero. In the case of an infrequent outbreak of White Spot, the pond is aborted immediately, and the pond disinfected thoroughly.

Growth sampling while I was there resulted in most ponds averaging 6-7 g ABW at Day 60 or so; this is good growth. The best pond averaged 11 g ABW at Day 58. That is terrific growth.

White shrimp (*P. vannamei*) are not considered for this region of the Philippines. It would take an extra P50/kg (P43:US\$1 at this writing) to get them to Manila for export, eliminating any possible profit margins, and making export competition with the big boys in the industry, the Thais, that much more difficult.

Further, the regional processing plants are set up to handle export of black tigers, not whites, especially into Japan, though also into the US markets. Prices are excellent for black tigers, a prediction I forecasted to my Filipino compatriots when I observed Thailand shifting entirely to whites from black tigers in 2005. There is always a large and lucrative market for the larger shrimp, especially in the 40 g range, and whites, of course, are a much smaller animal and would be hard-pressed to challenge even half that size.

Recommendations to managers: Recycling the effluent water with *Gracilaria* and other seaweed species for the absorption of nutrients; biofiltration and closed loop reuse of water; and use of grain straw to generate rotifer production for PLs prior to stocking.

Other prawn growers have shifted to finfish production: tilapia and bangus (milkfish). The reason most given is the high operating costs associated with a run of prawns, including all the now-deemed-necessary biosecurity capital outlays. Many former prawn growers are still a little nervous about the consistency of crops, whereas finfish production is pretty much guaranteed, though a run of finfish generates vastly lower returns.

### Bangus Production

The bangus grow-out utilizes lower initial feed inputs than tilapia, though the diet is more specific than tilapia in later culture. A long-established technique is for ponds that have completed production of fish are 'rested' with a low level of water. An algal colony (lumut) is grown on the muck. After 6-8 weeks, the pond is restocked, and the newly stocked fish aggressively consume the algal mats, eliminating the need for feed in the early stages. There are specific diets formulated for bangus, and this is widely utilized from mid-culture through to harvest.

The Philippines has long perfected the technique of sequential pond bangus rearing, moving the fish in predictable stages from first feeding through market size by moving the fish at prescribed stages to larger, prepared ponds.

Marketing of cultured bangus is difficult. There is a seasonality for the markets of bangus, most notably during major holidays, as bangus is the National Fish. The market price of bangus drops below cost of production – and significantly below the market price of tilapia – during the off-seasons, making the effective year-round farming and marketing of bangus, with its longer culture cycle, very difficult.

Export of bangus has been tried, but as the Philippine National Fish, it has specific international markets in areas with concentrations of Filipinos. The rest of the world has not caught on to its delectable taste, and has been troubled by the plethora of its intramuscular bones, making broader international marketing an uphill fight. All bangus production reviewed during this farmer to farmer activity was marketed locally, with no intention of international link-ups. There were some successful efforts into value-adding, such as manually boned fillets, smoking, and marinades, though these were only marketed in the provincial capital, Bacolod.

Where possible, bangus production has been intercropped with a culture cycle of prawns. This provides the opportunity to break infectious disease vectors that may be lurking. But this practice is not common. This was an option I recommended to select farmers who had experience culturing prawns previously.

### Tilapia Production

There are three significant tilapia growers in Negros Occidental. I visited with two of the managers, who collectively oversee/manage 11 farms of approximately 60 hectares of semi-

intensive tilapia production. Tilapia is their only aquaculture business; they do not grow prawns or bangus.

Tilapia broodstock are sourced from CLSU, Munoz, Nueva Ecija, and supplemented with new stock every few years to increase genetic diversity. They are all variations of *Oreochromis niloticus*. All fingerlings grown out in Negros Occidental are produced in hatcheries on Negros Occidental.

The small hatchery in the north provides most of the stock necessary for the region's production, including fingerlings to growers in the Bacolod and south regions. In the northern region of the province, the farmer/manager stocks methyl-testosterone sex-reversed fingerlings, 3-4 wks old, at 7 / sq meter. His ponds are old prawn farms, the ponds generally average 0.7 ha each. He manages six farms.

Prior to stocking, the ponds are dried and plowed, then filled, and the water cultured with algae produced from fertilizer, both inorganic and organic. The fish are fed to 50% of satiation, forcing them to rely on natural feeds. The resulting FCR is often less than 1:1.

Water is completely fresh water, and it is in short supply, only from rain. Management is closed system pond culture, with no new water added, by necessity. When the fish are harvested, the water is pumped to an adjacent canal, and returned for the next culture cycle, as it is in such short supply. Water depth is targeted at 1.2 meters. When it rains, excess water is pulled off the pond bottom, not the top, utilizing a venturi standpipe. Center drains are vestiges of the prawn culture days of the farms.

Survival is 60-70%. Given the difficult environmental conditions, even given the hardy nature of tilapia, they have infectious diseases. The symptoms – bulging eyes, lesions, distended belly – are bacterially and virally pathognomonic, and assuredly have their origins in poor environmental conditions.

Yet with these conditions, they are able to produce 250 g average crops in four months, with a net profit of >P25/kg on sales prices of P75/kg. The ponds are rested for two months, plowed, dried and limed if necessary, and another crop is planted, for two full crops per year.

In the Bacolod and south region of the province, the manager/farmer oversees the production of tilapia in five farms. The water is either fresh water, or slightly brackish (<5 ppt).

He stocks his five farms at 5 per square meter, and harvests 200 + g fish after five months. There is no premium for a larger fish, no fillet markets per se, so none larger than 250 g are grown.

He harvests continually, almost every day at one of his farms, never all at once, as the local markets would be overwhelmed. He works the markets constantly, timing his harvests with the wholesale buyers for the early morning beginning of the various markets in the area.

Generally, all tilapia produced on Negros are marketed on Negros. There is no margin to ship the fish anywhere. Price is pretty solid at P65-70/kg on Negros, and the market price is no higher in major population centers such as Manila. Infrequently, the Bacolod Manager contacts the Cebu markets when he is sitting on large volumes and has to unload some fish; but this is infrequent, because his profit margins are wiped out by transport and handling costs.

The Bacolod and south manager averages 1.6:1 feed conversion. He does not rely on natural diets for the early stages, as “that would get eaten within a week anyway”. Feeds utilized are the cheapest available, as the fish seem to get the same FCR whether there’s higher or lower protein, and with varying least-cost ingredients.

World commodity prices are driving up the cost of feed ingredients across the board, and even the cheapest diets are getting prohibitively expensive, squeezing the tight margins of regional tilapia production ever tighter. One of the managers suggested to me that he may be getting out of the business; the operational costs are so tight, the margins are so thin, that the smallest of disruptions will put him in the red, at which point he’ll have no choice but to terminate operations.

Security is an issue at all farms. Careful counts are made at stocking and at harvest. Whole teams of technicians – and guards – have been fired, as it is most often impossible to implicate just one person when others are inevitably colluding by looking the other way when there is theft.

Both managers get two crops of fish per pond a year. The time of pond rest is not great, generally 4-6 weeks, at most 8 weeks. Plowing and pond prep are often performed, but just as not always, as the fish are considered so hardy that even in poorer environmental conditions, it is often not deemed cost-effective to prepare the ponds properly.

Thus there is loss due to an infrequent disease, as mentioned previously. Unquestionably the diseases have their source as pre-disposing factors of deteriorated environmental conditions. Rather than test for oxygen, for example, they observe the pond first thing in the morning, and if the fish are ‘piping’, they will either add water (if available) or turn on paddle wheel aerators.

The die-offs remain infrequent enough that pond prep costs and other managerial inputs such as paddlewheel operations or ammonia testing are constantly compared with the loss of fish due to poor environmental conditions, and very often the managerial inputs lose in those calculations. Indeed, all operating costs are spread-sheeted and constantly refined to streamline efficiencies by both of these skilled managers.

Discussions with the managers included recycling of water, biofiltration, feed quality, markets and marketing techniques, environmental and infectious diseases, water quality management, and hatchery management.

## Schedule

Departed Wyoming 17 November, 2010 driving to Salt Lake City.

17 November Depart SLC – LAX – MANILA

19 November Arrive Manila

20 November Depart Manila for Dumaguete

21 November Drive to Bais

23 November Ferry to Bais to Cebu

24 November Ferry Cebu to Bais

1 December Drive Bais to Bacolod

5 December Fly from Bacolod to Cebu

6 December Fly from Cebu back to Bacolod

9 December Drive Bacolod to Bais

13 December Ferry to Cebu

14 December Ferry back to Bais

21 December drive Bais to Dauin

22 December drive Dauin to Bais

29 December Drive Bais to Dumaguete

29 December Fly Dumaguete to Manila to LAX

30 December Fly LAX-SLC and drive to Wyoming

<b>Location / Organization</b>	<b>Female</b>	<b>Male</b>
<b>18 farms total</b>		
<b>Direct contacts (adjusted for those present at multiple locations)</b>	<b>3</b>	<b>17</b>
<b>Indirect contacts (Staff at farms, 6-8 per farm, often related)</b>	<b>136</b>	
<b>Families impacted</b>	<b>50</b>	
<b>Recommendations</b>	<b>8</b>	

John



Weekly sampling of black tiger prawns. Note boots worn by everyone.



The Farm Manager oversees the weekly sampling of black tiger prawns.





Cast net sampling for growth assessments. Note the two layers of bird netting overhead.



Biosecurity at a black tiger prawn facility near Cadiz, Negros Occidental, Philippines. Note the two layers of bird netting, two ground net fences and a canal isolating the farm.



Black tiger grow-out ponds with an emphasis on Biosecurity, with bird netting, ground net fences, and footbaths to minimize horizontal disease vectors.



The reservoir pond for water treatment prior to flow to grow-out ponds. Note the configuration of channels to maximize settling. The water is typically screened prior to entry into the reservoir pond, settled for up to seven days, then screened again before entry into the culture ponds.



Weekly sampling for assessments of growth and health of black tiger prawns. Note the required use of boots.