

## PROFILE



Aerial view of Aquatec's main facilities in Barra do Calhaú as they are today.

# Brazil's Aquatec Shrimp Hatchery: a history of continuous adaptation

How a multi-faceted South American facility has weathered disease, boom and bust economic cycles and changing customer demands to become one of the country's leading suppliers of quality PL shrimp.

BY DIOGO THOMAZ



At Aquatec there are larval rooms for the nauplii and zoea stages; the facility is in effect two facilities, with all main rooms and water supply network duplicated so that one side can be shut down without compromising continuity of production in the hatchery. One reason this is so is the need to fully disinfect one whole room, a process that involves stopping production completely. A similar setup is available for the postlarvae area, where PLs are readied for the market. Most on-growers prefer to buy smaller PL10 larvae but many prefer to have a head start and get PLs that are 20-25 days old. The final product is what you can see in the picture above right. The variety in tank sizes has to do with preparing batches for different customers with orders that can be a few million PLs or a few billion. The tank on the second from the top left picture has a small conical tank with a high salinity brine that is used to slowly increase salinity in the PL tank as this batch is for a farmer that grows shrimp in sea-water.

**I**n Brazil, shrimp hatcheries are known as Laboratórios, and if Aquatec is a typical example then it's easy to tell why! The attention taken to the organization of space and personnel, hygiene, work processes and quality control is of a calibre seldom seen in many university labs.

This is not by chance though; it is the product of a 25 year history of continuous adaptation to a constantly evolving industry, adaptation to changes in farmed species, waves of economic booms and busts, diseases that spread over the industry like giant tsunamis, constant changes in customer demands, and many more pressures. In this report on a recent visit to the hatchery I will try to convey what I saw and what I think has allowed Aquatec to survive and remain a leader in this market.

### EARLY DAYS

Aquatec is right at the root of the Brazilian shrimp farming industry. Conceived in 1986 and founded in 1987, its first production came out in 1989, a year when in Brazil there were a few small hatcheries belonging either to shrimp on-growing farms or to state laboratories. Farmers without a hatchery had a tough time obtaining post larvae (PL) to stock and when they did the quality was rarely the best. Werner Jost was one such farmer, owner of Camanor and as they say: "Necessity is the mother of invention." Werner partnered with one of the few shrimp reproduction specialists in the country, Ana Carolina Guerrelhas, and both started Aquatec.

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It all starts with the selection and growth of the new broodstock lines where shrimp grow at up to 2 grams per week until they reach reproductive size of around 40g. After they reach this size the broodstock is conditioned in maturation tanks until spawning happens and eggs are collected.

**KEY DIFFERENCE**

One key difference between Aquatec and existing hatcheries of the time is that Aquatec was planned from the start to serve small and medium sized shrimp farmers that did not have a hatchery and only around 10% of its production would be targeted at Camanor. This apparently small difference in strategy resulted in an independent project that from the start faced the many pressures of its heterogeneous market and this gave Aquatec the distinctness and strength it has today.

Initially the Brazilian shrimp farming industry relied on local species such as *Penaeus subtilis* and *Litopenaeus schmitti*. These species had performance problems and the yield farmers could get out of them was limited. From 1992, with the introduction of the Pacific White Shrimp, *Litopenaeus vanamei*, everything changed. The potential of this species became immediately apparent and Aquatec lead the way by importing broodstock from Panama that became the source of the many generations of white shrimp that allowed Brazilian shrimp farming to jump from around 2,000 tons to over 90,000 tons in just one decade.

**FAST GROWTH**

The hatchery grew ahead of the industry; in fact it's fair to say that it pulled the industry with the increasing supply of good quality PLs. From under 40 million PLs produced in 1992, numbers rose almost 100 times in 10 years, to 3.6 billion in 2002; 300 million PLs per month. This growth was supported on investment in infrastructure and on personnel, through training programs, organizational improvements and very close attention to customers. All this lead to interest from foreign groups and in 2003 the company was bought by Sygen Ltd, a British genetic breeding company specializing in swine breeding but intent on entering other animal production sectors. Sygen brought considerable knowhow in genetics and selection and Aquatec started development of its own line of fast growing and high survival shrimp called SpeedLine.

The first batches of SpeedLine PLs were sold in 2005, but then owing to focus shifts at Sygen, the ownership of Aquatec returned to its original founders in 2006 but genetic breeding continued and today the company sells two lines, the original SpeedLine and SpeedLine SPF. It is Brazil's only hatchery with SPF (Specific Pathogen Free) broodstock and facilities to produce SPF PLs. The option to invest in new facilities to produce SPF PLs was made as a response to major viral epidemics such as the Infectious Myonecrosis Virus (IMNV) that culled almost half of production in 2004 and 2005 and the White Spot Syndrome Virus (WSSV) that first appeared in Brazil in 2005 and is still today a major problem for the industry.

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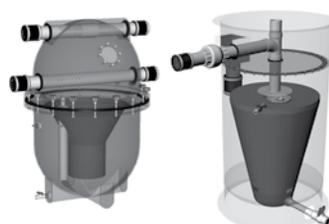
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## FIT FOR THE MARKET

From the brief history above, what have been the key selective pressures that molded Aquatec and made it what it is today?

- Complex customer base:** The fact the company serves not one or two main customers but a variety of small and medium farmers, producing shrimp with various degrees of management control, farm dimensions, different temperature and salinity profiles and geographic locations means that the infrastructure of the company and the production processes allow it to produce batches of various sizes, adapt PLs to different temperatures and salinities before shipping them and be robust to various types of husbandry. This flexibility is clear in the various dimensions of tanks available and sources of water as well as processes followed. This customer base also requires that Aquatec establishes a deep and extensive set of customer relations, with frequent visits, performance data collection and husbandry information that will allow it to supply the right PLs to the right customers.
- Performance pressure:** Having to produce PLs for such a heterogeneous market means that in its genetic and quality programs Aquatec must aim to produce PLs that will perform well in various environments, under different feeding and management regimes; This represents a major challenge for any breeding or quality program and often switches the selection targets from a single characteristic such as disease resistance to a specific virus or fast growth rate or high survival, to a target that is more basic such as stress resistance, that will represent an improvement in all the above characters but will show performance in various environments.

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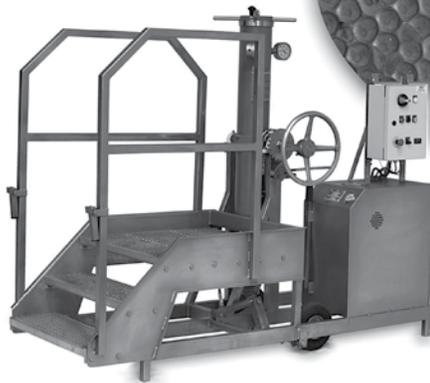
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The sense of organization and hygiene was always present throughout our visit to Aquatec. Bottles with hand disinfectant and footbaths were constant reminders that the facility we were entering was one where biosecurity was critical. Above you see the main entrance to Aquatec's offices; Ana Carolina Guerelhas, Aquatec's co-founder and Managing Director; the main personnel entrance and (below) one of the water treatment and temperature control stations.



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- Disease pressure:** When pathogens become ubiquitous, as the White Spot Syndrome Virus is today in Brazil, any strategy that delays the appearance and epidemics of the disease within a production pond will improve chances of a successful crop. If we associate with this delay a reduction in the production cycle (faster growth), then we increase even further the chances of successful. Aquatec combined its genetic selection program with an SPF program that ensures their PLs will be pathogen-free. Many other hatcheries in Brazil or elsewhere, will sell PLs that have a high chance of already being infected with viruses or other pathogens and that will be simply waiting for the right conditions to initiate the disease. Combining fast growing SPF PLs with strategies such as zero or no water renewal in the ponds during each production cycle or with biofloc technologies (also without renewal of the water in the ponds), may allow farmers to go through many production cycles without ever losing stock to disease.
- Large, well-trained workforce:** Compared with European or North American countries, salaries in Brazil are still relatively low; also, the fact that the country still offers a number of barriers to external companies and therefore many suppliers of technology do not have permanent establishments in the country, companies need to rely on own personnel to support many functions that in Europe or the US would be carried out by outsourced technicians (mainly in maintenance functions). The combined result is that the size of the work force in aquaculture companies in Brazil tends to be large and Aquatec is no exception. Over 150 people work in the hatchery making it a major source of local employment. This also means that the company has a major responsibility towards the local community and Aquatec takes this very seriously with a CSR (Corporate Social Responsibility) program that involves

organizations to support local women, help educate children, train staff, promote sports events, etc. Having such a large work force also requires that the hatchery has very robust and efficient work protocols, with staff well trained and with tasks very well defined. The need to keep good health and hygiene barriers between various parts of the hatchery, to avoid cross contaminations, to isolate production areas from common or external areas requires organization of the work force into teams, setup mechanisms to identify teams, develop paths within the hatchery where teams circulate or are not allowed to circulate... all this and much more has been implemented at Aquatec.

#### FUTURE CHALLENGES

The shrimp industry in Brazil is facing new challenges and changes; I suspect that on every producer's mind now is the concern about spread of EMS, a devastating disease that has reached Mexico already and soon will certainly come south. The overall strategy of Aquatec, keeping SPF lines and continuing its selection program should continue to bring value to Brazilian producers.

Industry consolidation, still in early stages, may be a tougher challenge to an independent hatchery although its size and unique technologies will definitely make it a prime target to some of the large investors entering this industry or expanding existing operations. The best way to deal with this is not straightforward and it could be a sale or the setup of large, long-term supply contracts. In the salmon industry now many hatcheries don't keep broodstock, instead they buy eggs from companies that specialize on genetic breeding and that supply advanced performance eggs.

There are a number of opportunities ahead for Aquatec and the organizational and infrastructure it built over the last decades has it in prime position to take advantage of these.



Larval stages are very demanding in algal supply and a significant area of the hatchery is dedicated to the maintenance and production of micro-algae.

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