

Marcos Villarreal R.



Shrimp Aquaculture Consultant Panama

Marcos Villarreal is a shrimp aquaculture consultant who recently managed the Arabian Shrimp Co. project on the Red Sea in Saudi Arabia.

He was part of the World Bank/Responsible Aquaculture Foundation mission to Mozambique and Madagascar that studied the white spot syndrome outbreaks of 2011 and 2012.

Villarreal started his career in 1986 at Agromarina de Panama S.A. and was president of the Panamanian Shrimp Growers Association from 1995 to 1997.

B Sc (Biology), MBA



Hands-On Experience On Shrimp Aquaculture In Saudi Arabia

Marcos Villarreal

ARABIAN PENINSULA



Subkha Saltflats-Easy Construction



It's all about Team Work



Leveling the grow-out ponds

Erosion Control Needed for Pond Dykes



Open Sea Access Necessary



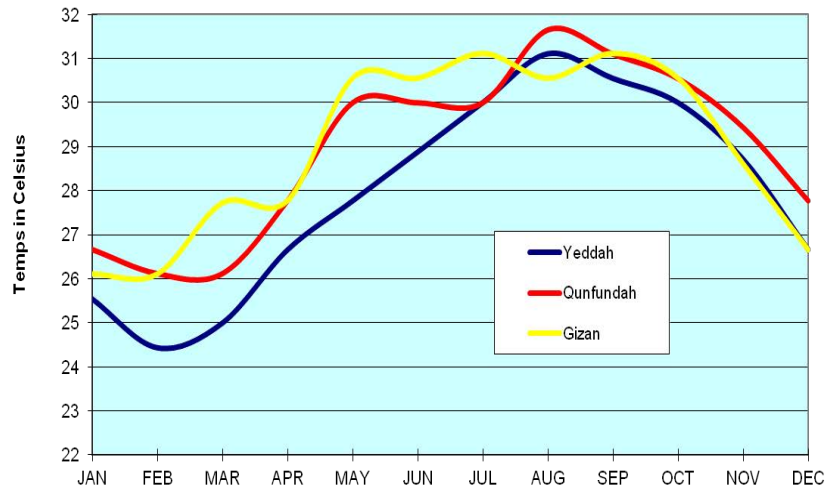
Intensive work on the Pump Station



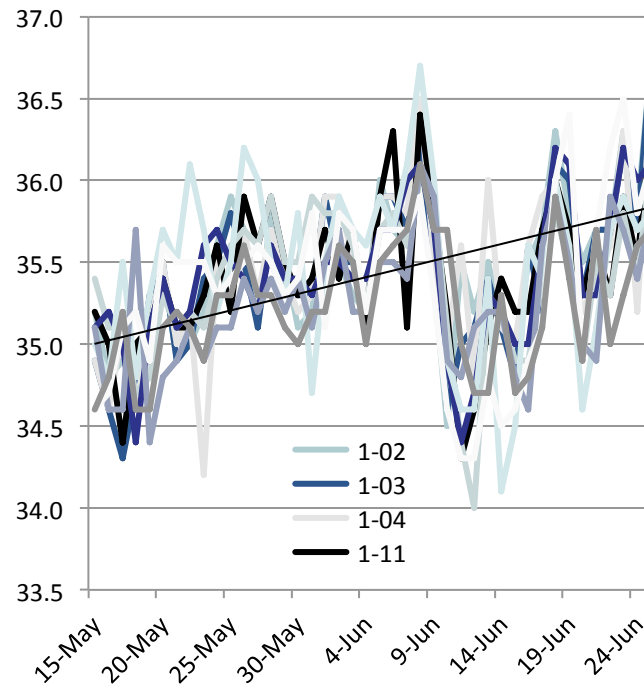
Installing The First of ten Pumps



Seawater Temp. in Major Culture Areas



P. indicus well adapted to these conditions



Sandstorm Effects

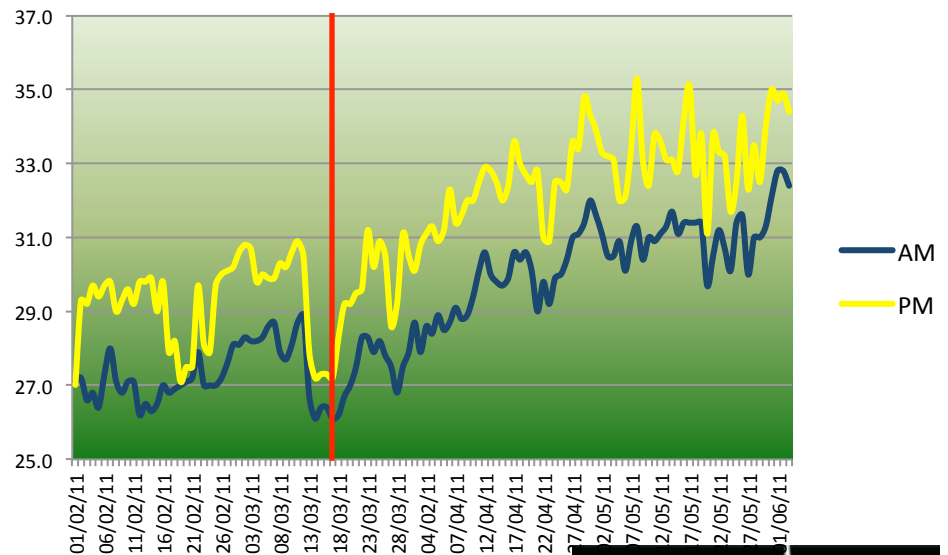


Temperature Fluctuations Due To Sandstorms

Sudden strong winds carrying heavy loads of dust.

Sometimes coming with heavy rains.

Sharp decreases in temperature are produced.



Total Hatchery Integration

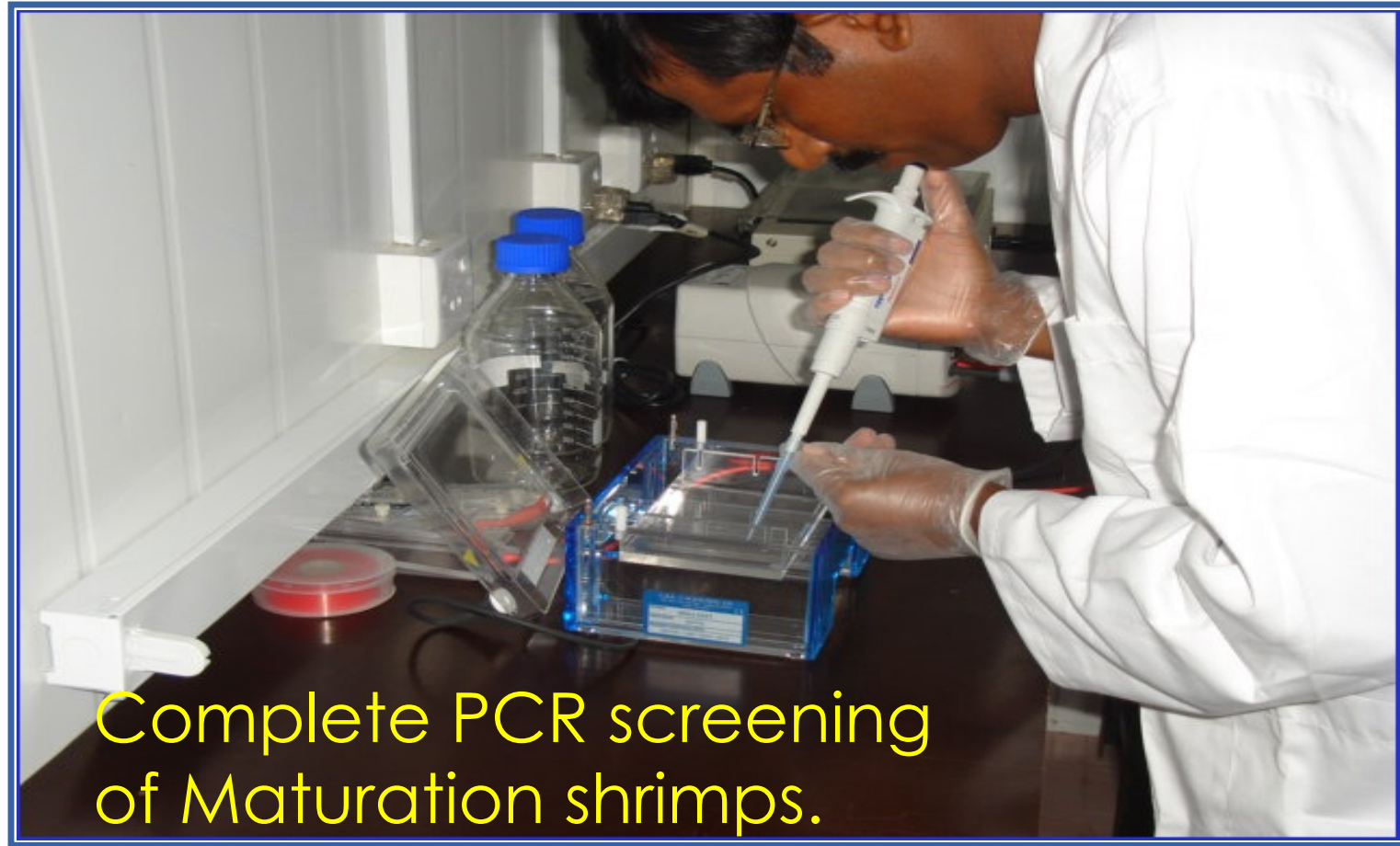


Algae, Breeders & PLs are totally produced on site.

Spawns produce 100,000 nauplii/female

Complete operations in high salinity (40PPT).

Diagnostic Capabilities on Site



Complete PCR screening
of Maturation shrimps.



Vertically Integrated Operations

Harvest results between 3,000 to 4,000 kg/ha/crop

Survivals at harvest of 55% to 70%

Growth rates 1.5grms /week average

Feed conversions 1.4 to 2.0



Feed Management



**Complete feed delivery
with feeding trays.**

Harvesting for a large local/regional market



Post Harvest Pond Preparation Procedures



Year round post harvest pond bottom preparation possible

LGP Tractor Needed for direct removal of organic matter

Tilling of Pond Bottoms for Improved oxidation of soils



Advantages For Shrimp Aquaculture In KSA

- Strong local and regional (GCC countries) seafood markets.
- Strong consumption of fresh (not frozen product.)
- Producers can sell directly to buyers, without the need to invest in processing plants.
- Good communications between producing areas and consumer markets.
- Good access to financing, high support from government.
- Local cultivable species adapted to extreme salinity and temperature conditions.
- Excellent sources of water with outstanding chemical and physic characteristics.
- Weather conditions allowing for year round pond maintenance.

Disease Management

- Other diseases have been reported before:
- TSV and *Microsporidia* sp.
- Through constant screening and production of resistant breeders these diseases have been controlled.
- Same applies to WSSV, that had an outbreak along the Red Sea coastline of Saudi Arabia in the 1st Quarter of 2011.
- Saudi Government implemented National Sanitary Strategy and Policies.
- Disease now mitigating, preliminary results in southern region very encouraging.
- Most farms are planning restart of operations with diversification with fish with significant Government support.
- Requires additional research into bio-security in high salinity, high temp. conditions with little to no rainfall

THANK YOU

MERCI.....