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All About Shrimp

Season Greetings! For those of you who celebrate, Merry Xmas and a Happy New Year from all of us at Aquaintech Inc.

As the decade draws to a close, we want to thank all of our customers for their continued support. The global shrimp farming industry will be ending this year at or near a record high level. Unfortunately prices are low along with profits. This is a recurrent issue that reflects inadequate market development and an industry that is far from being sustainable. There have been notable declines in production in some countries during 2019 and some notable increases. Production in China and Taiwan continues to drop because of disease and environmental issues. Ecuador continues to increase in production as does India.

FRAUD IN INDIA AND VIETNAM

As a small businessman there are many challenges working with a global market. Not the least of which is finding honest distributors. As we noted in prior issues of this newsletter, we have been the victims of unethical activity on the part of several companies in India. As of this writing this continues. The PRO4000X product line has been discontinued in India for the time being. Anybody selling this product is cheating you.

Recently we were forced to terminate our working relationship with a long time distributor in Vietnam, Thanh Vuong. They violated most of the terms of a contractual obligation with us and appear to be selling some of our products at extremely high dilutions despite contractually obligating themselves not to do so. They are no longer allowed to be selling PRO4000X, and any of our Aquapro lines, including PRO-B, PRO-F, PRO-EZ, etc.

If you are buying these products from them they are not selling you our product and anybody who would cheat us is not someone that one should be relying on as an honest vendor.

AquaInTech Inc is short for:

Aquaculture/Information/Technology

We offer a variety of products and services to the international aquaculture community. The goal is to ensure that farmers are provided with tools that work and honest and forthright explanations of what it factual, what is science based and what is not. This is an industry where the Latin adage, "Caveat Emptor", let the buyer be aware holds particularly true.

Each edition of this newsletter deals with a different topic. We are starting with a once a quarter edition which we hope to increase as resources and interest dictate. Your feedback will decide if we continue. To date there has not been enough feedback for us to consider that there is real interest in our continuing. We will continue for 2020 and should nothing change the last issue will be in December 2020. Depending on the topic, there will be a variety of links that are intended to educate. The goal is to help you, the readers, to better appreciate the role of science in your activities. Sustainable production must use science based production methods.

A recent article, Why Are Antibiotic Residues in Farmed Shrimp a Big Deal?, that I authored has been published several times. This article discusses the issue of antibiotic usage in shrimp farming and why the abuse of antibiotics is a bad idea for all concerned. Despite this, wide spread misuse/abuse continues. This is largely a reflection of the fact that much of the worlds farmed shrimp is produced by poor farmers who have little choice but to use whatever they can to keep their animals alive and gamble that they will not be caught. Larger farms get caught in this trap as well. Unfortunately this will not change until the industry is much more consolidated and stops relying on pseudo science and snake oil salesmen for advice and products.

The article is available at these links.

https://www.bioremediationaquaculture.com/publications.html

https://www.aquaculturealliance.org/advocate/antibiotics-in-aquaculture-is-responsible-use-possible/

On November 27, 2019 Dr. Newman was in Las Mochis, Mexico where he gave

a presentation at ConAcua 2019 entitled Bioremediation or Probiotics? The presentation can be found at the link below. The gist of his presentation was several fold:

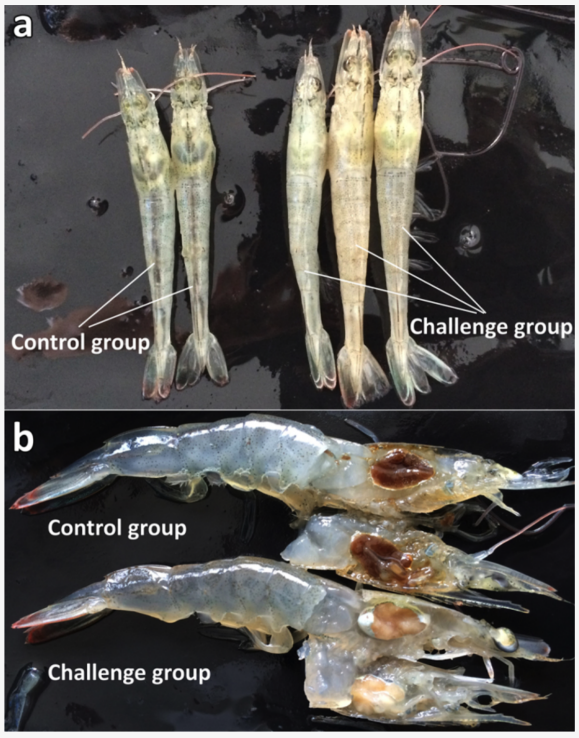
1. Probiotics as defined by the FAO/UN do not exist for shrimp. Living organisms that are ingested orally that colonize the gut with subsequent impact on the animals health is the universally accepted definition. There is no evidence that this occurs in shrimp in the field.
2. The pond side production of bacteria for addition to ponds is a bad idea without a high level of quality control. Bacteria are dynamic and constantly evolving. Blindly growing up poorly characterized mixtures of various bacteria is gambling with the health of the shrimp and the farmers health. There is no evidence that this actually improves production. Having to add these concoctions every few days is a waste of money and resources.
3. The use of a tableted product results in significant benefits with none of the risks and works better than the addition of bacteria grown pond side.
4. The global shrimp farming industry does not rely on science for the most part and the industry is populated by pseudoscientists who perpetuate myths that damage the industry and ensure that sustainability remains elusive.

https://www.bioremediationaquaculture.com/links-from-newsletter.html

More About SHIVD

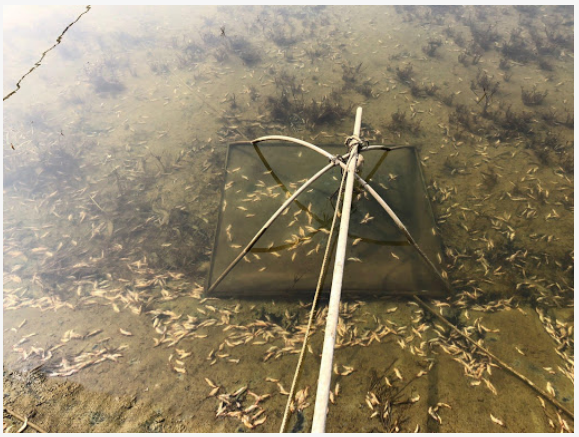
In the last issue we posted a photograph of a mass mortality of farmed shrimp in Taiwan from the Shrimp Hemocyte Iridescent Virus Disease or SHIVD. This is a double stranded DNA virus that was first reported in China in 2014. Diseased *Litopenaeus vannamei* typically are not feeding, presenting empty stomachs and guts. The HP is pale and animals can present with soft shells and reddish discoloration. To date the virus has been detected in the white shrimp, *P. chinensis*, *Macrobrachium rosenbergii*, *Procambarus clarkii* and *Cherax quadricarinatus.* It is highly likely that it will be found to be infective for other farmed and wild crustaceans and given its widespread prevalence along coastal China it is highly likely that it has spread much more widely than reports suggest.

It caused massive mortality when first reported in China and is doing so in Taiwan. It has been found in Thailand and it is highly likely that it will spread into other areas if it has not already done so. Given the propensity of many governments to deny the presence of emerging viruses, it will take a massive outbreak for this to change.



From: Qiu, L.; Chen, M.M.; Wan, X.Y.; Li, C.; Zhang, Q.L.; Wang, R.Y.; Cheng, D.Y.; Dong, X.; Yang, B.; Wang, X.H.; Xiang, J.H.; Huang, J. Characterization of a new member of Iridoviridae, Shrimp hemocyte iridescent virus (SHIV), found in white leg shrimp (Litopenaeus vannamei). Sci. Rep. 2017, 19, 11834, doi: 10.1038/s 41598-017-10738-8.

Typical appearance of affected shrimp.



(personal communication)

Devastating impact on a pond in Taiwan earlier in 2019.

This virus is characterized as an emerging virus and as is characteristic of most emerging viruses the full impact of it has not been felt. We are still in early days. If the industry learned anything from WSSV, there is hope that this impact will be minimized. If not, it is only a matter of time until large producers, such as India and Ecuador end up impacted. Broodstock, PLs, etc. and even frozen animals need to be tested for the presence of this virus and every effort made to keep it out of maturation facilities, etc.

Is Sustainable Shrimp Farming Achievable?

For the last three decades I have been working with shrimp farmers around the planet. When I began to learn about this industry, I saw a fairly primitive industry driven largely by poor people trying to make/strike it rich. Some science-based approaches were in use and a very small percentage of serious individuals understood that without this there was no sustainability. The availability of specific pathogen free (SPF) shrimp was an important first step, although the predominance of pseudoscience and out right greed on the part of many ensured that even today this tool has not realized its full potential.

Sustainability appears to be a difficult concept for many to grasp. Many believe if they are certified by third parties that this equates with sustainability. Many also believe that if they are working with SPF animals that this also means that they are sustainable. True sustainability does not exist in shrimp farming today, although in the last 30 years there are some that are pointed in the right direction, even with strong forces working against them.

Sustainable production requires a solid market for the final product that while fluctuating does not muscle farmers into selling crops at or below their costs. Moreover, it also requires that the environmental impact of the process is as minimal as it can be. This means that waste streams are not discharged untreated into the environment. Much as with human sewage, it must be converted into microbial biomass or some other suitable by product that does not pollute. It means as well that as much control as is realistic is exerted throughout the production process. Poor survivals, poor growth, excessive waste of feeds, utilization of products that do nothing but add to the cost of production, etc. are all inconsistent with true sustainability. Farmers must be empowered to exert as much control as they can to ensure consistency.

Given the short nature of these comments I am focusing on one aspect that I view as essential. Disease is natural. The absence is not. Monoculture is not natural and the stresses that result from working with non-domesticated animals typically ensures that animals will be impacted by disease. Proactive management is essential. This equates quite simply with prevention of the entry of obligate pathogens into production systems, management of stressors to lessen animal susceptibility and the use of tools that help the animal deal with the presence of opportunistic pathogens. Ideally, growing shrimp indoors in highly controlled environments would appear to be one important element of this. However much as with other things in life, the devil is in the details.

The advent of nucleic acid-based detection technologies, notably PCR (measures presence) with the subsequent development of real time PCR (quantifies levels of target organism(s)) has been essential for the development of SPF animals. However, it is widely misused. The failure to understand that statistical based testing methods always have a potential for errors is perhaps the largest single failing of PCR testing. Random sampling of a population is required, and samples cannot be pooled as this can dilute positives resulting in reduced test sensitivity (false negatives). Furthermore, the costs of testing are not conducive to being able to cost effectively screen individual broodstock. Testing every individual animal is the only way to ensure that a population is actually totally free of a given pathogen (this is simplified as consistent testing of captive populations held for multiple generations is also capable of ensuring that a population is truly SPF).

PCR technology is evolving and in its latest iteration we are seeing a breakthrough in costs. The technology that Genics Pty. Ltd (https://www.genics.com.au) is offering, as it becomes widely adopted, will replace conventional testing. The ability to screen for 13 pathogens (this is not a fixed number, and more are possible) from a single sample for a few dollars per pathogen opens the door to developing truly SPF stocks and keeping them this way.

Most science-based farmers know about IHHNV. This virus has been impacting shrimp farming since its inception. The virus rarely kills today although it can weaken animals making them more susceptible to other infections. It is endemic and until very recently it was widely held that it could never be eliminated. Most of the time today the impact is high coefficients of variation (large numbers of disparate sizes at harvest), stunted growth, some deformities and higher FCRs. The impact on profitability is problematic in global production environment where even a small impact can reduce profitability to the point where country wide industries cannot compete. What if it could be eliminated?

Sellars et al. (see below) were able to demonstrate that testing individual broodstock and using those with low viral loads as the source of PLs resulted in a dramatic potential for improved production. The impact of this virus can be mitigated. Being able to eliminate viral pathogens that are passed horizontally is essential for sustainable production. Some would argue that their presence if not problematic if they do not cause acute disease, however this is a distortion of the facts. Shrimp are often carrying multiple pathogens and how these interact is not well understood. More than likely, as with other animals, there can be synergistic effects that would increase susceptibility to one pathogen

simply because another is present.

I am of the opinion that given the availability of this technology that broodstock companies that do not take advantage of this really do not care about their clients. They are in it for the money. There is now no excuse not to screen individual broodstock and begin the process or lowering specific pathogen loads in populations with the goal of eliminating them from the farm environment.

It should be noted that no one is saying that these pathogens may not be present in the environment already. Appropriate biosecurity strategies are needed to lessen the risk from this route. Ensuring that they do not enter the production system via post larval shrimp that are carrying them as a result of infected broodstock is a critical component of control.

Sellars M.J., Cowley J.A., Musson D., Rao M., Menzies M.L., Coman G.J., and Murphy B.S. Reduced growth performance of Black Tiger shrimp (Penaeus monodon) infected with infectious hypodermal and hematopoietic necrosis virus. 2019. Aquaculture 499: 160-166. https://doi.org/10.1016/j.aquaculture.2018.09.032