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Practical management practices for incidence of White Faeces Syndrome (WFS) in cultured Pacific White leg Shrimp (*Penaeus vannamei*)

S. Karthick[1] and S. Aanand[2]
[1]Aqua Consultant - Bhimavaram West Godavari, Andhra Pradesh
[2]Assistant Professor, Erode Bhavanisagar Center for Sustainable Aquaculture, TNJFU, Bhavanisagar, Erode, Tamil Nadu

SUMMARY

Vannamei farming is the fastest growing aquaculture sector globally and well established as the major protein source to fulfil the protein demand replacing the natural resources which are over exploited. Shrimp actively graze on the substrate present in the pond bottom and water column for feed. In a healthy shrimp, the gut is a vital organ, important for various functions, such as immunity, health regulation in addition to nutrient absorption. These functions effectively are achieved by bacterial metabolism in the gut. The shrimp are highly exposed to the exchange of microflora between the environment and the digestive system. This increases the risk of proliferation of unfavorable gut microflora or frequent destabilization of the microflora, either of which can affect the optimal functioning of the digestive system. This forms the most important reason for several gut track diseases in shrimps. Therefore, understanding the role of the gut microbiota of L. vannamei is important for improving the growth performance and overall yield.

INTRODUCTION

Acute hepatopancreatic necrosis disease (AHPND) in cultivated shrimp can be identified by the prevalence of vermiform, gregarine-like bodies within the shrimp hepatopancreas (HP) and midgut of cultivated giant tiger shrimp (*P. monodon*) and whiteleg shrimp (*P. vannamei*). In high quantity they result in white fecal strings and a phenomenon called white feces syndrome (WFS) (Tangtrongpiros, 2010). These vermiform bodies consist of Aggregated Transformed Microvilli (ATM), originated due to sloughing from epithelial cells of the shrimp hepatopancreatic tubules. These vermiform bodies accumulate at the hepatopancreas-midgut junction prior to discharge along with feces, and interfere in nutrient assimilation by the villi and resulting in the poor growth. When the occurrence of ATM is severe, it can lead to the formation of white fecal strings in shrimp. In ponds with high stocking densities, faecal strings float alone or accumulate in floating mats, hence, the appropriate name white faeces syndrome or WFS. The white faeces appear to be more buoyant than normal and float on the water surface because oil globules present in gut are present in the faecal material.

Shrimp hepatopancreas becomes whitish and soft, and the animal loses appetite. Infected shrimp when viewed in light can be seen to have a white mid gut region and hence also known as White Gut Syndrome. ATM can sometimes occur in association with shrimp hepatopancreatic diseases such as the acute hepatopancreatic necrosis disease AHPND Septic Hepatopancreatic Necrosis (SHPN), caused by vibrio species, vibriosis, and parasitemia with the microsporidian *Enterocytozoon hepatopenaei* (EHP). Incidences of WFS are associated with high stocking densities, poor water quality, poor pond bottom, high plankton blooms and bad feed management, climatic conditions coupled with organic loads that stimulate, selection and proliferation of opportunistic pathogens like bacteria, virus, fungi, protozoa etc. The affected shrimp to eat less and are darker in colour. In severely affected shrimp hepatopancreas and gut become white and pale in colour. Early disease indications appear in feed trays and at water surface, where abundant floating white feces are observed. The affected shrimp show a loose exoskeleton and protozoan fouling infestation that causes a dark colouration of gills.

Signs and symptoms of WFD in shrimp:

- Hepatopancreas and gut become white and pale in color
- Floating white feces strings
- Slow growth
- Infected shrimps show loose shell

White faecal matter floating on the pond water

WFS infected shrimp

Factors triggering WFS

Vibriosis:

The white gut disease (WGD) observed in shrimp farms and Vibriosis is one of the major disease problems agent in aquaculture. Vibriosis is a bacterial disease responsible for mortality of cultured shrimp worldwide. Vibriosis is caused by gram-negative bacteria in the family Vibrionaceae. Outbreaks may occur when environmental factors trigger the rapid multiplication of bacteria already tolerated at low levels within shrimp blood or by bacterial penetration of host barriers. The exoskeleton provides an effective physical barrier to pathogens trying to penetrate the external surface of crustaceans, as well as the foregut and hindgut. Six species of Vibrio viz., *V. harveyi*, *V. parahaemolyticus*, *V. alginolyticus*, *V. anguillarum*, *V. vulnificus* and *V. splendidus*, are associated with the diseased shrimp

Accumulation of sludge:

Accumulation of sludge in intensive shrimp ponds, is primarily due to faeces, uneaten feed and dead phytoplankton. Sludge deposits, increase biological oxygen demand (BOD), result in mineralization of nutrients from organic matter, and formation of toxic metabolites. Sludge forms the source of plant nutrients which can result in unnecessary blooms. Such plankton blooms cause pH fluctuations. Excess blooms can lead to artificial eutrophication in culture ponds wherein, the phytoplankton die off, causing anoxic conditions and production of toxic gases.

Dirty pond bottom and Toxic gases:

Cleanliness of the pond bottom and feeding area, is an important management activity in shrimp culture. Poor pond bottom management, during culture results in buildup of large amounts of organic matter. Adequate aeration is essential for proper development of beneficial bacteria and improper placement of aerators may result in insufficient oxygen for aerobic bacteria to decompose organic matter. Subsequently anaerobic bacteria will take over decomposition of organic matter, giving off byproducts such as ammonia, nitrite, hydrogen sulfide that are harmful to shrimp.

Over feeding and poor feed quality:

Over feeding is a common problem faced by farmers, which is generally determined by the amount of feed remaining in feeding tray. Farmers should actually keep track of their survival rate. When survival wrongly estimated to be higher, when in reality it is lower, it leads to overfeeding. Application of low-quality shrimp feed results in low digestibility and low nutrients absorption, leaving large amount of undigested feed in faeces and in

check trays, miss leading farmers to reduce feeding. This leads to underfeeding which in return leads to poor growth.

Phytoplankton crash:

Intensive and super-intensive shrimp ponds result in high nutrient loads affecting the dynamics of phytoplankton growth. When phytoplankton grow fast, water colour is becomes dark, pH fluctuates, resulting in crash. Phytoplankton crash causes build-up of organic matter in the bottom of the pond.

Climatic changes:

Climatic change can cause extreme changes in temperatures and sudden rainfall makes shrimp more susceptible to disease.

WFS Management

Biosecurity:

Prescribed biosecurity systems have to be used as per regulations and policies to prevent and control the spread of diseases. The key elements of biosecurity are a reliable source of stocks, adequate detection and diagnostic methods for excludable diseases, disinfection and pathogen eradication methods, best management practices, and practical & acceptable legislation. Hence, the strict principles and guide lines of biosecurity to be adapted in individual farms and cluster wise in farming areas. PCR screening of brood stock before spawning and PCR screening of larvae (PL) before stocking can help to avoid the entry of pathogens into aquaculture system.

Water quality management:

Once White faeces syndrome is identified, water has to be sanitizied to reduce microbial load. This is carried out by applying Potassium Monopersulfate or Quaternary Ammonium compounds like Benzalkonium Chloride commercially called as BKC at 1 PPM in pond water. 48 h after sanitization, soil probiotic has to be applied in order to inoculate beneficial microbes to degrade organic loads followed by zeolite to eliminate ammonia nitrate and other toxic gases via cationic exchange as standard procedures followed routinely in farm management. The dosages as advised by the farm technician may be adopted for successful control of WFS.

Good nutrition and immunostimulant:

After completion of water treatment, animals need to be treated via feed supplement and functional feeds. Shrimp must be fed supplement with binding gel gut acidifiers like organic acid and lactic acid bacteria to reduce gut pH level, which will reduce the pathogen level also. Along with gut probiotics and enzymes produced will give improve nutrient absorption by gut villi. Vitamin c and chelated minerals improves immunity and reduce the mortality rate of shrimps. Thus, probiotics in the culture system reduces incidence of diseases. Feeding immunostimulants improves shrimp immunity to diseases / infection. A number of microbial molecules such as feed additive probiotic, b 1,3 glucans, peptidoglycans, polysaccharides have been proven to stimulate the non-specific immune mechanisms in shrimp.

Improving environmental conditions

The environmental parameters can play a significant impact on shrimp health, growth and production. Most disease problems are triggered by deterioration of water and soil quality. Application of probiotic that are capable of oxidizing toxic wastes are useful in improving soil and water quality in shrimp culture ponds. Early

detection and diagnosis are crucial factors to well-timed and prompt control. Effective management of the health of shrimp requires consideration of delicate balance between the host, pathogen and environment.

The recommended practices for improved shrimp culture to prevent WFS are listed bellow

- Sustainable approaches to modulate the gut microflora in farmed shrimps for preventing gut diseases
- The use of selected bacteria (probiotic) to inoculate the gut
- Specific nutrients promote the development of selected bacterial strains (prebiotics) in gut
- Specific natural compounds (mostly derived from yeast and herbal extracts, so called "phytobiotics") capable of modulating the microflora towards a favorable composition
- Favoring the development of beneficial bacteria and inhibiting potentially pathogenic micro-organisms in gut
- A suitable Central drainage system, with 'shrimp toilet' in the pond may be designed for the periodical removal of sludge

CONCLUSION

The Best Management Practice (BMP), quarantine system and good feed management practice are to be followed during entire culture period to overcome the disease problems in shrimp culture.

REFERENCES

Tangtrongpiros J (2010) White feces disease in cultured marine shrimp. Document distributed at a public seminar at the Veterinary Medical Aquatic Animal Research Center (VMARC), Faculty of Veterinary Science, Chulalongkorn University, Bangkok, Thailand. 16 pp. (Tanslanted from the Thai language)

https://www.viv.net/articles/news/prevention-and-treatment-of-white-feces-disease-wfd-in-shrimp

https://en.engormix.com/aquaculture/