

## MiCroBial Disease Management Program

### Aquaculture Diseases

Intensive and semi intensive aqua farming accompanies several disease problems often due to opportunistic pathogens as evident from general aquaculture. High stocking densities, high food inputs and other organic loads stimulate the selection and proliferation of opportunistic pathogens like bacteria, virus, fungi, protozoa etc. Shrimp are actively grazing on the substrate present in the pond bottom and water column. Therefore they highly expose to the exchange of micro flora between the environment and the digestive system. There are suggested entry of port for the pathogenic bacteria such as water, feed and air. This increase the risk for the proliferation of an unfavorable gut micro flora or frequent destabilization of the micro flora which can affect the optimal functioning of the digestive system. Furthermore the digestive system of shrimp is the main entry of port from protozoa, bacterial and viral infection which remain major risk of the profit ability of shrimp production. Presently these are the most important Gut track disease in shrimp,

- White Feces Syndrome (WFS)
- White Gut Disease (WGD)
- White Muscle Disease (WMD)

### Preventive & Control Measures

Effective management of the health of shrimp requires consideration of delicate balance between the host, pathogen and environment. Disease and production problem are vary during the different phase of shrimp culture. Production shortages resulting from shrimp mortality, slow growth and high FCR occur and affect the economics of shrimp farms. Most often pathogens are present in association with the environment and shrimp are apparently healthy and show normal growth. Often conditions such as high stocking density, poor water quality, and sudden changes in environmental factors precipitate diseases in shrimps. Some of the important strategies for gut health management have been outlined below:

- Sustainable approaches to modulate the gut micro flora in farmed shrimps for preventing gut diseases.
- The use of selected bacteria to inoculate the gut (probiotics)
- Specific nutrients promoting 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 micro flora towards a favorable composition.
- Favoring the development of beneficial bacteria and inhibiting potentially pathogenic micro-organisms in gut.

A synergistic blend of herbal extracts has the bacteriostatic and bactericidal properties against pathogenic and potentially pathogenic bacteria. Furthermore, this synergistic blend has proven to be a powerful interrupter of bacterial and effectively modulate for the gut flora.

The presence of a synergistic blend of phytobiotics provides an array of antimicrobial activities in the shrimp's digestive system. This offered additional protection against co-infections with opportunistic bacteria such as vibriosis, main cause of white gut disease.

### Mode of Action of Probiotic in Disease Control

The effect of probiotics is linked to the gastrointestinal tract and effects on incidence of diarrhea and other gut infections were expected. In general, the mode of action of probiotic feed additives is mainly based on

- Competitive exclusion
- Bacterial antagonism
- Immune modulation

### **Competitive Exclusion**

Competitive exclusion is defined by the ability of normal micro flora to protect against the harmful establishment of pathogens. The concept of competitive exclusion indicates that cultures of selected probiotics supplemented to the feed, compete with potentially harmful bacteria in terms of adhesion sites and organic substrates (mainly carbon and energy sources). The adhesion to the digestive tract wall could be for different purposes, to prevent colonization by pathogenic microorganisms or to compete for nutrients.

### **Competitive Adhesion to Digestive Track Wall to Prevent Colonization of Pathogen**

Detrimental bacteria need to become attached to the gut wall to exert their harmful effect. Herefore, an expected effect of the addition of probiotics to the gastrointestinal tract is an increase in normal micro flora colonization with inhibition of the adhesion of harmful pathogens on the intestinal epithelium, thereby blocking receptor sites and preventing the attachment of other bacteria including harmful species. By doing so, the probiotic bacteria exclude pathogens and thus prevent them from causing infection.

### **Competing with Pathogen for Nutrients in Gut**

Probiotics may compete for nutrients and absorption sites with pathogenic bacteria. In addition, competition for energy and nutrients between probiotic and other bacteria may result in a suppression of pathogenic species. The gut is such a rich source of nutrients that it may seem unlikely that microorganisms could not find sufficient food for growth. Probiotics possess a high fermentative activity and stimulate digestion. Lactobacilli are known to produce lactic acid and proteolytic enzymes which can enhance nutrient digestion in the gastrointestinal tract. Different studies demonstrated that probiotics maximized crude protein and energy digestibility compared with those in non-probiotic treatments. However, it should be noted be that the environment only has to be deficient in one essential nutrient in order to inhibit microbial growth.

### **Bacterial Antagonism**

Probiotic microorganisms, once established in the gut, may produce substances with bactericidal or bacteriostatic properties. Bactericidal activity: Lactobacilli ferment lactose to lactic acid, thereby reducing the pH to a level that harmful bacteria cannot tolerate. Hydrogen peroxide is also produced, which inhibits the growth of Gram-negative bacteria. These substances have a detrimental impact on harmful bacteria, which is primarily due to a lowering of the gut pH. A decrease in pH may partially offset the low secretion of hydrochloric acid in the stomach.

### **Neutralization of Enterotoxins Produced by Pathogens**

Probiotic bacteria produce a variety of substances that include organic acids, antioxidants and bacteriocins. These compounds may reduce not only the number of viable pathogenic organisms but may also affect bacterial metabolism and toxin production. Bacteriocins produced by lactic acid bacteria have been reported to be able to permeate the outer membrane of gram-negative bacteria and subsequently induce the inactivation of gram-negative bacteria in conjunction with other enhancing anti-microbial environmental factors such as low temperatures, organic acids and detergents. In addition, they can prevent amine synthesis. Coliform bacteria decarboxylate amino acids to produce amines, which irritate the gut, are toxic and are concurrent with the incidence of diarrhea. If desirable bacteria prevent the coliforms proliferating, then amine production will also be prevented.

### **Management of Disease Control**

**Avoidance of pathogens:** This can be done through selection of specific pathogen free stock, exclusion of carrier animals in culture systems, screening of healthy and disease free shrimp and larvae through quarantine systems , stocking of SPF /SPR seeds ,filtration and sanitization of water before intake.

**Improving host conditions through good nutrition and immunostimulation:** A number of microbial molecules such as feed additive probiotic and prebiotics have been shown to stimulate the non-specific immune mechanisms in shrimp.

**Improving environmental conditions:** The environment has a greater role and significant impact on shrimp health, growth and production .Most disease problems are triggered by deterioration of water and soil quality. Application of probiotic can capable of oxidizing toxic wastes and be useful in improving soil & water quality in shrimp culture ponds.

## MiCroBial Technologies

The core MiCroBial Technologies provides a natural biocatalyst made via a novel fermentative process that has been continually refined by microbiologist in India. MiCroBial Technologies probiotics consists of a select consortium of bacteria, enzymes, nutrients and co-factors that performs different functions of inhibiting growth of pathogens. These microbes produce different types of enzymes as amylase, Protease, Lipase, Cellulase etc. MiCroBial Technologies probiotics works in aerobic and anaerobic conditions as it contains aerobic and facultative anaerobic microbes.

## Benefits of MiCroBial Technologies

- Promote fish, shrimp prawn growth rate and production
- Inhibit the growth of pathogenic bacteria by competing with them for food and reduce the chances of infection
- Increase Feed Conversion Rate (FCR) aquatic animal.
- Increase Body Weight Gain (BWG) in aquatic animal.
- In-take of the feed will go up
- Restores the resistance
- Restores the Growth
- Act as anti-microbial agent
- Prevents infectious gastrointestinal disease
- Improves the intestinal microbial balance
- Release antimicrobial compounds and modulate immune activity
- Beneficial in treatment of White Feces Syndrome, White Gut Disease and White Muscle Disease etc.

## Composition

MiCroBial Technologies probiotics is a consortium of probiotics belongs to Bacillus, Lactobacillus. Yeast, Herbal extract and enzymes etc

## Application of MiCroBial Technologies Probiotics

Take required quantity of MiCroBial Probiotics and mix with protein gel. This solution mix with feed and dry it for 10 min and spread over the feeding area.

**Dosage** - 4 gms per kg feed /twice a day

## Storage:

Product is delivered in sealed, moisture proof packaging. Product should be stored in a cool dry location, out of the sun and protected from insects. Once opened, MiCroBial™ Technologies Probiotics must be kept dry in an airtight container to prevent activation. Do not Freeze

## Product shelf life:

1 year (minimum) under standard warehousing/office conditions

For dosing concentration and application, please contact to our technical team.

Please refer to the MiCroBial Technologies website for the appropriate MSDS, [www.microbialtech.com](http://www.microbialtech.com)