

Shrimp Disease Management in Intensive Lined Ponds and Lined Tanks

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Shrimp are very primitive animals; therefore, they are sensitive to environmental and nutritional stresses and easily infected with pathogens (virus, bacteria, microsporidians and fungi) in stressful environments, which can result in disease outbreak. The top four disease challenges in shrimp today are WSSV (white spot syndrome virus), AHPND (acute hepatopancreatic necrosis disease), EHP (*Enterocytozoon hepatopenaei*) and WFD (white feces disease). These serious diseases have caused huge losses in the global shrimp economy. Some of the first steps to help shrimp farmers be more successful in managing against disease is first recruiting a batch of healthy and specific pathogen-free postlarvae followed by managing the environmental and nutritional stresses. These steps, along with improvements from shrimp feed mills in creating premium and functional feeds, will help the shrimp industry thrive and become more sustainable.

Managing Environmental Stresses Should Focus on the Following Approaches:

- Farm designs need to have a big reservoir pond (at least 1 ha to 5 ha), with a depth of 2.5 to 3.5m and a length of at least 100m to give organic matter, as well as microsporidian spores, time to settle at the bottom. Clean water on the surface at the other end is then filtered into treatment ponds through fine meshes.
- Water in treatment ponds should be treated with chlorine at 30 ppm (active 65% to 70%) for 24 hours, followed by strong aeration at least 12 hours before using shrimp tanks.
- Shrimp ponds need to get 5% to 15 % of daily new water exchange for the first 45 days and around 20% to 30% of daily new water exchange after the first 45 days. However, water exchange should not exceed 20% per occurrence, which means you need to have 2 times of water exchange for the days after daily water exchange rate is over 20% of total water volume in the pond.
- As feed is not much provided to the shrimp pond during the first 45 days, the “brown-water approach” using *Bacillus sp.* strains and molasses works well to control ammonia and nitrite in water and help to maintain with such low water-exchange rates of 5% to 15% a day. More

feed will be provided to the shrimp pond after 45 days then “green-water approach” using rice-bran, probiotics and molasses as “Synbiotic concept” plus higher water-exchange rates of 20% to 30% works better to remove ammonia and nitrite in the water.

- High dissolved oxygen (6 to 8 mg/L), high alkalinity (150-180 mg/L) for the first 45 days during “brown water” and minimum 100 mg/L after the 45 days once more water-exchange rates of 20% to 30% being applied, and pH 7.5 to 8.0 with morning pH and afternoon pH varies less than 0.3.
- The right feeding program is also a key factor to control environmental stresses, as overfeeding could cause a drastic increase in ammonia and nitrite in water, as well as promoting for Vibrio loading in environment; while underfeeding would stress animal health and increase sensitivity to pathogens invading the body. Different shrimp feeds from different shrimp feed mills should produce different feeding programs for their shrimp farmers, but more feeding times per day should be promoted during the nursery phases (6 to 10 times per day) to prevent both underfeeding and overfeeding during this nursery period.

Managing Nutritional Stresses Should Focus on the Following Approaches:

- Use premium-quality feed for shrimp based on high-quality raw materials with consistent quality (such as fishmeal, SBM, Wheat Flour, Krill meal, hydrolyzed fish soluble, Squid Viscera and Marine-Origin Cholesterol). Include vitamins and minerals together with excellent grinders and good cooking processes. Also, reduce SBM inclusion to be below 25% in the formula to avoid negative impacts of the anti-nutrient factors to shrimp intestine/gut. Controlling the maximum SBM inclusion and replacing of low-quality fishmeal and animal protein sources in piglet diets are a part of the solution for controlling gut disease and diarrhea in the piglet industry. This should be considered in shrimp feed formulation, too.
- High-nutrient quality feeds for shrimp during the first 45 days need to be used for shrimp starters (shrimp from PL10 to 5g) with protein level at a minimum of 45%, basing on digestible amino-acid formulation.
- Functional feed for the first 45 days by using additional sources of bioactive fermented proteins (Motiv, for example) to provide shrimp additional short peptides, prebiotic metabolites, organic acids and carotenoids to promote gut health and immune booster for better stress resistances. In addition, higher inclusion of vitamins and minerals, as well as cholesterol, choline, chlorine and some special L-amino acids or other key health additives for shrimp such as nucleotides, sorbitol and MOS (Mannan-oligosaccharides) should also be considered to be formulated in shrimp functional diets. Enzyme and probiotic coatings for shrimp extruded feeds would also be a great solution to help better digestion and to inhibit pathogens in the hepatopancreas and gut/intestines.

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