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Benefits of diagnostic monitoring

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Vaccines and good husbandry, sanitary practices are also crucial to prevent infectious diseases

Disease-related financial loss can be one of the highest costs of operation in aquaculture. These losses range from acute mortality due to disease outbreaks, to insidious, sub-acute infections that can decrease feed conversion rates, increase labor costs, and decrease carcass value at harvest.

Diagnostic monitoring and prevention are two of the most cost-effective means of avoiding the economic losses caused by pathogens. They are valuable management tools with which to make rapid, prudent management decisions. Over the past decade, the field of diagnostics has developed ever more-sensitive detection systems. There are many stages in the production cycle where such diagnostic tests are useful.

Collecting postlarvae for diagnostic evaluation.

Testing broodstock

The first is in the screening of broodstock to prevent the potential spread of a pathogen from parent to offspring (vertical transmission). The most sensitive system available is desired if the goal is to establish a breeding population free of a specific pathogen.

Testing young animals

Routine diagnostic testing is also valuable in monitoring very young animals. These animals are usually segregated into groups that are raised in small tanks, ponds, or raceways; or further separated in individual, free-standing buildings, or rooms within a building. It is wise to periodically monitor these groups because if a sample from a tank comes up “hot,” reflecting an infection or increased level of the pathogen, you want to prevent the potential spread to other tanks that may occur through normal husbandry practices.

For example, if the people maintaining the facility come in contact with the infected tank and then go to other tanks to distribute feed or manipulate the system, they run the risk of spreading the pathogen throughout the facility. Or, as in many operations, animals from several tanks may be combined in large runs or bigger ponds and tanks as the animals grow. If one hot tank is combined with several clean tanks, all the animals can become infected.

Testing at stocking

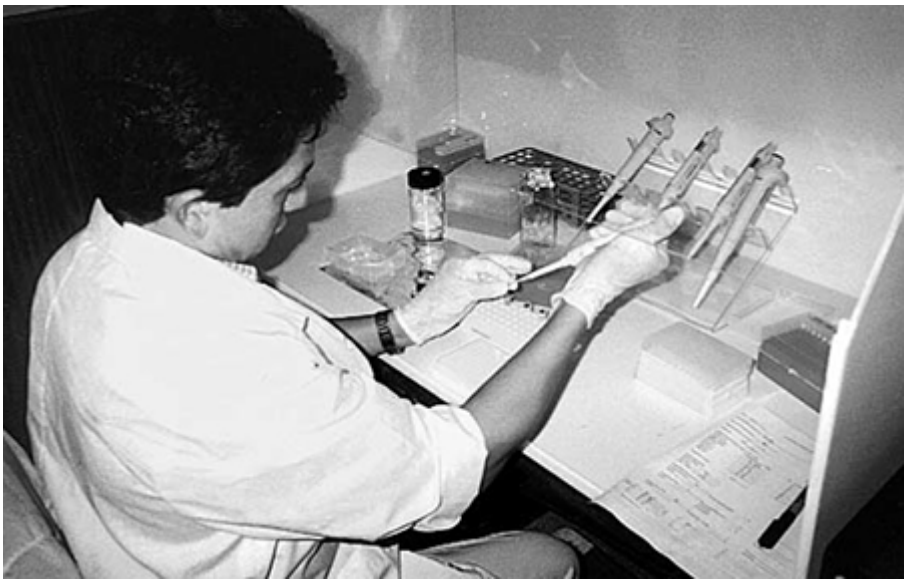
Another critical point for testing is at the time of stocking. If you are purchasing animals to stock a grow-out facility, have them checked for the presence of pathogenic agents so you do not introduce them into your operation.

Stocking is typically a very stressful time for the animals. They are subjected to physical stress such as handling and transport, environmental stress such as different water temperature or salinity, and perhaps even physiological stress such as smoltification or molting. All of these will exacerbate an infection if it is present, and may induce increased shedding of the agent from infected animals.

Testing during grow-out

Routine testing during grow-out is also a good management practice. If it is determined very early in grow-out that the pathogen load is escalating dramatically, management may decide to eliminate the population, decontaminate, and restock.

This has the advantage that if you are producing a season-dependent aquatic species, you can still restock to take advantage of the weather, photoperiod, etc. Monitoring can also be a cost-saving measure, as you will not continue to feed a population of animals that will have a lower survival- to-market weight, or that is using the feed energy to combat the infection rather than gaining weight.



Pipetting shrimp DNA for amplification by PCR.

If, on the other hand, the pathogen load is increasing dramatically late in grow-out, the decision might be made to harvest early. Although top dollar might not be gained for the product, some value may be recouped in a situation where, if harvest was delayed, the entire crop might be lost.

The most difficult grow-out situation is where the pathogen load increases during the middle of grow-out. Even here, the earlier you detect an increase in pathogen load, the better your chances for obtaining successful treatments.

Early detection and action

Animals, like humans, stop eating when they become ill. Therefore, early application of medicated feeds is costeffective because the animals that need the antibiotic will still consume the feed, thereby reducing waste and cost. In addition, early medication decreases the amount of antibiotics required to obtain the desired effect.

Secondary infections

Even in the face of viral infections, secondary bacterial infection with such pathogens as Vibrio may be the ultimate insult. Here, too, the early administration of medicated feeds can be beneficial.

Also, by monitoring on a pond-by-pond basis, the farmer can apply therapeutants or targeted management changes only to the affected ponds, rather than a farm-wide approach that might be unnecessary and would be more costly. Other potential management interventions that can be taken in the face of increased pathogen load are the reduction of stocking density, administering of immunomodulators and improvements in nutrition and water quality.

Conclusion

Disease outbreaks significantly alter product quality and disrupt production schedules. To prevent and control these disease outbreaks, a broad-ranging, preventive-medicine approach is required, as in the poultry and swine industries.

An integral part of a preventive-medicine program is the use of diagnostic tests at strategic points in the production cycle. However, diagnostics alone will not win the battle against the spread of infectious diseases. The administration of effective vaccines (where available), as well as good husbandry and sanitary practices, must also be implemented as components of a preventive-medicine approach.

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