

Prophylaxis, Hygiene and Therapy in Fin Fish and Shellfish Diseases

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Introduction:

Prophylaxis refers to all the preventive steps such as vaccination, immunostimulation and use of pre and probiotics including group improve routine husbandry practices that are taken during a hatchery and farming operation to minimize the load of pathogen and to prevent the occurrence of a disease. The prophylactic measures therefore leads to the maintainance of the health, hygiene of the fish species in aquaculture. It is pertinent to mention that fish are subject to therapy in those cases when a disease is developed that the life or performance of the fish is immediately endangered or us expected to be endangered in the subsequent period. Therapeutic treatment should be regarded as emergency measure resorted to when prevention has failed. Application of drugs and medicines has become inevitable to maintain the heath of cultured and the environment. Prophylactic approach in aquaculture will reduce our dependence on antimicrobial, disinfectants, anti-parasitic drugs which are known to be harmful to the host and the environment in the long run.

Prophylactic Measures Used In Aquaculture:

The general prophylactic measures followed in aquaculture operations are:

1. Better management practices for optimum culture environments.
2. Use of pre and probiotics.
3. Enhancing the general disease resistance by immunostimulants.
4. Immunization of host against specific pathogen using vaccines.

Prebiotics:

Prebiotics are non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth or activity of one or a limited number of bacteria in the colon and thus improves host health. Certain non-digestible carbohydrates seems authentic

prebiotics. They include resistant insulin and oligofructose, lactosucrose etc. Prebiotics have the binding capacity therefore increasing the absorption of minerals such as magnesium, calcium and iron. Prebiotics have been reported to have numerous beneficial effects in fish such as increased disease resistance and improved nutrient availability.

Probiotics:

The probiotics were defined as the live microbial feed supplements that improve health of an organism (man and terrestrial livestock). The concept of aquatic probiotics is a relatively newer. There are the big differences between terrestrial and aquatic animals in the level of interaction between the intestinal microbiota and the surrounding environment. On the other hand, potential pathogens are able to maintain themselves in the external environment of the aquatic organisms and proliferate independently of the host. The bacterial community composition of the intestinal tract of aquatic animals is different from that found in terrestrial animals for which the probiotic concept was developed. The probiotic treatments are particularly desirable during the larval stages.

Verschuere *et al.* (2000) defined aquatic probiotics as "Live microorganisms that have a beneficial effect on the host by modifying the microbial community, associated with the host, by ensuring improved use of the feed or enhancing its nutritional value, by enhancing the host response towards disease, or by improving the quality of its ambient environment. Probiotics that currently used in aquaculture industry include a wide range of taxa from *Lactobacillus*, *Pediococcus*, *Streptococcus*, *Bacillus*, *Flavobacterium*, *Cytophaga*, *Pseudomonas*, *Alteromonas*, *Aeromonas*, *Enterococcus*, *Nitrosomonas*, *Nitrobacter*, and *Vibrio* spp., yeast (*Saccharomyces*, *Debaryomyces*) etc.

Aquatic probiotics are mainly of two types:

- 1. Gut probiotics:** Mixed with feed.
- 2. Water probiotics:** This proliferates in water medium.

Vaccines:

A vaccine is any biologically based preparation intended to establish or to improve immunity to a particular disease or group of diseases. Vaccines work by exposing the immune system of an animal to an "antigen"- a piece of a pathogen or the entire pathogen and then allowing time for the immune system to develop a response and a "memory" to accelerate this response in later infections by the targeted disease-causing organism. Vaccines

are normally administered to healthy animals prior to a disease outbreak. There are various criteria for the vaccine to be ideal such as:

1. Safe for the fish, the person(s) vaccinating the fish, and the consumer.
2. Protects against a broad strain or pathogen type and gives 100% protection.
3. Provides long-lasting protection, at least as long as the production cycle.
4. Easily applied.
5. Effective in a number of fish species.
6. Cost effective; and
7. Readily licensed and registered

Vaccines are administered to fish in one of three ways: by mouth, by immersion, or by injection. Each has its advantages and disadvantages. The most effective method will depend upon the pathogen and its natural route of infection, the life stage of the fish, production techniques, and other logistical considerations. A specific route of administration or even multiple applications using different methods may be necessary for adequate protection.

Immunostimulants:

In recent years the application of vaccination in respect to finfish and immunostimulants in respect of shrimp/finfish for disease management in aquaculture is being increasingly recognized. Generally, immunostimulants enhance individual components of the non-specific immune response but this does not always translate into increased survival. In addition, immunostimulants fed at too high dose or for too long can be immunosuppressive. The use of immunostimulants in fish culture or in aquaculture of other species for prevention of diseases is a promising new development. In general, immunostimulants comprise a group of biological and synthetic compounds that enhance the non-specific defense mechanisms in animals, thereby imparting generalized protection. This protection may be particularly important for fish that are raised in or released into environments where the nature of pathogen is unknown and immunization by specific vaccine may be futile. Immunostimulants can be classified into several categories by their origin and mode of action:

- ★ Bacteria and bacterial products
- ★ Complex carbohydrates

- ★ Vaccines
- ★ Immunity enhancing drugs
- ★ Nutritional factors
- ★ Animal extracts, cytokines
- ★ Lectins, plant extract.

Development of immune stimulants for use in aquatic organisms was slow due to the lack of understanding of basic immunology and the efficient parameters to evaluate the immune response in crustaceans and molluscs. With recent studies related to aquatic organisms the immunostimulants are used against resistance to the pathogen. Some of the common immunostimulants used are Muramyl dipeptide, Chitin and chitosan, Levamisole, Gulcan etc.

Therapy in aquaculture (finfish and shellfish):

Fish are subjected to therapy in those cases when a disease is so developed that the life or performance of the fish is immediately endangered or expected to be endangered in the subsequent period. Therapeutic treatment should be regarded as emergency measure resorted to when prevention has failed.

The therapeutic treatments may be as follows:

1. Application of therapeutic substances and preparations to the aquatic environment (therapeutic baths for fish and eggs)
2. Administration of therapeutic substances in feed
3. Administration of therapeutic substances via a probe
4. Administration of therapeutic substances by means of injections.

Some of the antibiotics used for disease treatment are:

Renamycin, Bactitab, Chlorsteclin, Cotrim-Vet, Orgacycline-15%, Oxysentin 20% and Sulfatrim are antibiotics with different trade names. The active ingredients of such antibiotics are mainly Oxytetracycline, Chloro-tetracyclin, Amoxicillin, Co-trimoxazole, Sulphadiazine and Sulpha-methoxazole. Also many chemicals are used in aquaculture like potash, regitrol, malachite green, formalin etc.