

Vaccination Method

Vaccination Methods

Vaccines may be delivered to fish by

- Intraperitoneal or intramuscular injection method
- Oral vaccine method
- Direct immersion method

Vaccination is done to the healthy fish because it is a preventive measure and not a cure.

Oral Vaccination

During the oral vaccination, the vaccine is given orally and it may be either through feed, where it is either mixed along with feed or coated on top of the feed or bio-encapsulated. During oral vaccination proper care must be taken to ensure that the antigen is successfully absorbed into the body. It is because the antigens incorporated in feed may be the heat sensitivity or the digestive system may digest the antigen. So when the vaccine is coated on the feed usually a coating agent is applied to prevent leaching of vaccine or to prevent the digestion of an antigen in the acidic environment of the fish stomach. Bio encapsulations are used usually when the fish fry are to be vaccinated, Bio encapsulation include the live feed such as *Artemia nauplii*, copepods or rotifers which are fed after incubation in a vaccine suspension. During incubation they accumulate the antigen in their digestive tract and as such, transform themselves into living microcapsules.

Advantages

- Vaccine mixed with feed
- Easiest method for mass vaccination of all sizes of fish
- Saves labour
- Avoids stress to fish

Disadvantages

- Large quantities of vaccines are required
- Some fish may not consume the feed.
- Protection generally weak and of short duration

Immersion vaccination

Fish being aquatic in nature it is constantly surrounded by the microorganisms of which some may be pathogenic ones. These fish have a mechanism to recognize these pathogens and elicit an immune response. So when the fish comes in contact with vaccine during immersion these vaccine is absorbed by the skin and gills, the specialized cells such as antibody-secreting cells are activated and will protect the fish during the later stage of exposure to the pathogen.

Immersion vaccine can be applied in two ways:-

- Dip method
- Bath method

Dip method

In dip vaccination method fish are immersed in a highly concentrated vaccine solution for very short time say usually few minutes.

Bath method

In bath vaccination method fish are immersed in a lower concentration of vaccine solution for a longer period, usually one to several hours.

Advantages

- Suitable for mass vaccination of all sizes of fish
- Reduced stress for fish
- Lower labour costs
- Less risk to vaccination team

Disadvantages

- Major disadvantages are the large amount of vaccine required
- Lower level of protection and
- Low duration of immunity

Injection vaccination

Vaccination by injection works well with fish that are 5–10 g or larger and the injection vaccination is very popular in salmon industry. Light anaesthesia is given to the fish before injection to prevent mechanical injuries and also to overcome handling stress. Vaccine can be administered through intramuscular or intraperitoneal with intraperitoneal vaccination is being very common. The immune response development depends on the needle and method of injection. Short needles might deliver the vaccine in the muscle and cause inflammation and a bad immune response, while long needles may damage the internal organ. The right thickness of needle is also important because the viscous vaccine has to pass through the needle and if the needle is too large the vaccine may fall back and may lead to infection. Once vaccination is administered it will take weeks to develop immune response, so it is important maintain the fish in ambient temperature and not to stress fish because temperature variation and stress may suppress the immune system.

Advantages

- Provide protection for long duration
- multiple antigens can be administered in single injection
- every fish in farm can be vaccinated
- every fish in farm receives the correct dose
- Highly efficient in generating both humoral (antibody) and cellular cytotoxic response

Disadvantages

- Needs sophisticated machinery or large skilled workforce
- Significant handling stress and risk of post vaccination fungal infections
- Local reactions
- Unsuitable for small fish