

# Vaccine and Vaccine Failures in Animals: Significance of Responsible Use of Vaccines

## Letter to Editor

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## Letter to Editor

The livestock industry is extremely important to the economy of developing countries and includes not only commercial producers of meat and milk, but also small producers with a few animals. Producing and delivering wholesome food, and ensuring food safety is the responsibility of every livestock producer, large or small. Most commercial producers follow a quality assurance program implementing a series of good production practices to ensure safe and wholesome food production. Producers with only a few animals need to follow the same standards. Healthy animals usually grow faster and more efficiently. Healthy animals do not require treatment for health problems, this removes the risk of drug residues and removes the cost of treatment. It is cost effective to prevent disease rather than to treat sick livestock.

Livestock are susceptible to a variety of diseases. One key to keeping livestock healthy is by implementing a proper vaccination program. Having a valid veterinary-client-patient relationship is a key first step to understanding what is involved in developing a vaccination program and in getting guidance if an animal becomes ill. Veterinarians or local extension office can provide useful advice in dealing with specific production practices. The purpose of a vaccine is to provide exposure to a non-virulent (non-infective) form of a disease agent before the animal is exposed to a natural infection. Vaccination causes the animal to develop antibodies and cellular resistance that protect against disease or infection. It is always preferable to prevent disease rather than having to resort to treatment.

The consequences of disease may be transmission to other animals or people, loss of efficiency through reduced animal growth, drop

in milk production and death. Good husbandry, including efficient bio-security measures, is the most important factor in prevention of diseases in livestock. Nevertheless, animals can become ill and highly infectious diseases can spread rapidly with devastating results. Vaccines are an important part of the veterinarian's toolbox.

## How do Vaccines Work?

Vaccines stimulate the body to produce its own defense against infection. Mimicking what happens when an animal has been exposed to disease, the body and its defensive system will "remember" the identity of the invading organisms. So, when the animal comes into contact with a disease, its body is ready to fight it and the animal will not fall ill and suffer. This protects the individual animal and because this animal will not develop the disease and will not become infective, it will also help protect the population from the disease - "herd immunity".

A vaccine may consist of live but attenuated viruses or bacteria, or killed (inactivated) viruses or bacteria, or parts of them.

- "Killed" or inactivated vaccines are prepared from killed organisms or fractions of the organism incapable of causing disease. They generally provide a relatively short period of immunity.
- In attenuated vaccines, the immunizing agent (antigen) is an organism such as a virus, bacterium or parasite, which has been developed to stimulate the production of the appropriate antibodies without causing the disease. Live vaccines are particularly effective in providing long-term

protection, because they are a more powerful stimulus to the immune system. They are also more versatile in their route of administration.

- Biotechnology can provide vaccines for diseases which cannot be controlled by conventional vaccine technology and create more specific, better defined products with even greater safety and efficacy.

Vaccination can be by a wide variety of routes: through water, baits, air spray, eye inoculation, intranasally, orally or using the more classical injection.

Achieving initial immunity may require more than one injection. Once established, this can be boosted by subsequent vaccination, as required. Modern vaccine research and technology means that some vaccines can actively protect against a variety of diseases, in a single product. These are called multivalent vaccines and using these reduces the number of injections, broadens disease protection - and helps reduce costs to the farmer.

#### Factors to be considered during Vaccination

Vaccination is not a simple process that automatically produces immunity. There are many reasons that vaccines can fail as noted below;

##### Animal factors

- Immune status
- Maternal protection (colostrum)
- Age
- Concurrent infection
- Vaccination
- Nutritional status

##### Environmental factors

- Temperature
- Air quality
- Feed/water access
- Density
- Seasonal influence
- Transport

##### Factors associated with pathogen

- Exposure level
- Virulence
- Survival outside host
- Transmission
- Wrong Serotype
- Potency and Purity
- Outdated Vaccine

#### Vaccine failure can occur due to many causes

- Improper storage
- Temperature
- Ultraviolet light
- Use after expiration
- Attenuated vaccines need to be used soon after mixing
- Insufficient time between vaccination and exposure

#### Improper administration

- Dosage
- Needle length and gauge
- Needle hygiene
- Syringe management

#### Improper mixing of vaccines

- Different pH and diluents

#### Improper timing

- Too early (maternal interference)
- Too late (already in disease process)

#### Animal factors

- Environmental stress
- Transport

Even when a vaccine is administered properly and an immune response occurs, it can fail to protect from disease.

Vaccine failure can be minimized by carefully handling and administering the product:

- Keep vaccines refrigerated (not frozen).
- Keep vaccine out of direct sunlight.
- Be sure to use vaccines before expiration date.
- Vaccinate healthy animals, avoid vaccination of stressed livestock.
- Follow all label directions on proper routes of administration and injection site selection.
- Vaccines are administered with a repeating syringe and you will need enough doses to vaccinate all animals, allow for some waste and accidents.
- Keeping opened containers or reconstituted vaccines is not recommended which may lead the vaccine to fail to achieve protection and it could also cause illness due to the growth of contaminants in reconstituted vaccines.
- In general, vaccines take 10-14 days to give protection. Vaccination should be part of a herd or flock health program. For vaccines to be most effective consider their use carefully

in relation to the type of stock, season, previous property history and disease incidence e.g. young animals should be protected against the common and predictable diseases before management events such as castration, shearing, weaning and movement to new properties.

- To get the most out of your vaccines protect them from heat or sunlight by keeping them in an Esky until required. Keep vaccines and equipment away from dirt and dust, which can contaminate equipment and introduce infection. Use a small table to help keep vaccines and equipment clean and off the ground.
- Do not mix different vaccines together. Combined vaccines require a great deal of care in balancing the components. However, if more than one vaccine is required use separate syringes and administer them at different sites, at least 15 cm apart and preferably on different sides of the animal's body.
- If conducting tick fever vaccinations, do not give other vaccinations at the same time. If it is unavoidable, use a separate syringe for each treatment and administer them on opposite sides of the animal's body. Ideally, other inoculations should be performed either two weeks before or four weeks after tick fever vaccination, particularly in adult animals, which are more likely to react to the tick fever vaccine.
- Avoid carcass damage by administering the vaccine according to label instructions and use the least commercially valuable site on the animal, for example high on the neck behind the ear.
- When vaccinating a herd, ensure a full dose of vaccine is given to every animal. Check syringes carefully to ensure that the correct dose is being delivered. Give the required booster injection at the correct time to all animals that require it.
- Follow all label directions on vaccination of pregnant animals, and age of animals at vaccination.
- In addition, it may be necessary to administer booster injections if indicated on the label directions.