

Vaccination

The newborn calf derives passive immunity to common diseases in its environment from maternal antibodies received in colostrum (sow's milk). These maternal antibodies, which can only be absorbed into the calf's bloodstream in the first 12 to 24 hours after birth, provide the calf with some protection for the first three months of life. However, the calf requires vaccination to develop active immunity and maintain resistance. Vaccination of maiden heifers and cows prior to calving will increase protection of the newborn calf.

Excluding calf diarrhoea, the major dairy cattle diseases in Queensland that are controllable by vaccination are tick fever, leptospirosis, ephemeral fever (three-day sickness), vibriosis and the clostridial diseases. Of these, tick fever causes the greatest economic loss in Queensland. *Leptospira* and clostridia are environmental organisms but, under the right circumstances, they can infect and rapidly multiply in an animal, causing illness and death. Vibriosis is sexually transmitted, and controlled by vaccination of the bull or artificial insemination of the herd.

Disease risks

Dairy cattle differ from other types of livestock production systems because they have management factors that increase the risk of exposure to infectious diseases. These factors primarily include:

- close contact within the herd
- confinement during milking and yarding
- moist conditions
- early weaning
- intensive feeding.

A vaccination program is important to minimise infectious diseases, which can spread to infect many animals in the herd.

Vaccine types

Vaccines are not all alike. All vaccines program the animal to mount an effective immune response against specific pathogens or their products, but they operate in very different ways, as discussed below.

Killed vaccines - toxoids

Many vaccines, such as the clostridial vaccines, are called toxoids. They use killed organisms or their toxins and do not necessarily prevent infection, but they should ensure that antibodies produced by the animal neutralise the harmful toxins arising from infection. To be effective, two doses are needed four to six weeks apart, and a booster is advised for each year after that.

Live strain vaccines

Other vaccines, such as for leptospirosis, use small doses of attenuated (weakened) live strains of the disease organism to stimulate the animal's immune reaction to produce antibodies without causing serious disease. As with toxoid-type vaccines, a second dose increases the animal's immune response.

Vaccination against tick fever also relies on infecting cattle with live strains of the tick fever organism that do not cause serious disease. However, only a single dose is required.

Natural exposure after the initial vaccination for clostridia and tick fever should keep the immune system primed after the initial course of vaccination. Annual booster vaccination of the herd against leptospirosis and clostridial diseases increases the passive protection that calves receive through maternal antibodies from colostrum (milk).

Antitoxin injections

Antitoxin injections (as used for tetanus and snakebite) depend on a passive immunological response by injecting the animal with neutralising antibodies to a specific toxin. Treatment is given therapeutically (clinical signs) or prophylactically at the time of challenge (e.g. surgery, castration or injury). This gives the animal an immediate, short period of protection but not a long-term, active immunity to a disease.

Immune response vaccines - external parasites

Vaccination against cattle tick infestation is a different situation. In contrast to disease-causing bacteria, the cattle tick is an external, bloodsucking parasite. The tick vaccine (TickGARD PLUS) is developed from a protein normally found in the gut of the tick, which the animal is never naturally exposed to. Vaccination stimulates the animal's production of antibodies to this protein. When the tick ingests blood, these antibodies attack the tick's gut lining, giving it a bellyache (blood leakage from the gut), and reducing its viability and ability to reproduce. The vaccination must be repeated every 10-12 weeks to be effective.

Human health risks

In the dairy industry, vaccination is important in preventing two diseases in humans: leptospirosis and Q fever, which may cause serious disease in people.

Diseases to vaccinate against

- Leptospirosis (transmissible to humans)
- Clostridial diseases (tetanus, malignant oedema, blackleg, enterotoxaemia and black disease)
- Botulism
- Bovine ephemeral fever (three-day sickness)
- Vibriosis (bovine genital campylobacteriosis)
- Tick fever
- Tick infestation
- Colibacillosis (white calf scours)
- Q fever (transmissible to humans).

Vaccination tips

- Follow the manufacturer's instructions.
- Store and handle vaccines correctly to ensure their effectiveness.
- Adhere to safety precautions if workers handle vaccines and associated equipment.
- Safely dispose of used equipment, and avoid environmental contamination.
- Ensure that animals are in good health to optimise immunity.
- Be aware that vaccination does not provide instant protection. Generally, full protection does not occur for up to four weeks after the initial dose.

Source: Queensland Department of Agriculture, Fisheries and Forestry; 2010