

CATTLE VACCINES

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Veterinary biological products are antigen and antibody products, produced by laboratory techniques, that use microorganisms such as bacteria or viruses.

Vaccine products contain high numbers of modified (live) or inactivated (killed) organisms or subunits (portions) or inactivated toxins (waste products) of organisms known to cause a particular disease. These products deliver antigens that stimulate the body's immune response through the production of antibodies. Antibodies also are found in biological products such as antisera, antitoxins, colostral antibodies and monoclonal antibodies. Biological products can be administered to cattle before exposure to disease to provide protection and after exposure to disease to reduce spread of infection.

A vaccine containing inactivated toxins is called a toxoid. A toxoid is not a killed vaccine or a modified live vaccine.

A vaccine containing killed bacteria is called a bacterin. Adjuvants are added to bacterins to increase effectiveness of the antigens. Adjuvants slow the release of the antigen into the body and prolong the immune response. Antigen-adjuvant mixtures form tissue deposits at the injection site beneath the skin (subcutaneous) that are observed as knots in the skin. Also, injection site lesions in the muscle can be caused by intramuscular injections of vaccines containing an adjuvant.

NONINFECTIOUS VACCINES

Noninfectious vaccines are unable to infect and replicate. They are usually much safer to cattle than live vaccines but may be weaker in their ability to stimulate an immune response. They are approved for pregnant cows and calves nursing pregnant cows.

Noninfectious vaccines include killed vaccines, bacterins, toxoids, leukotoxoids and chemically altered, body temperature sensitive, modified live vaccines that are injected intramuscularly. To be effective, two doses of a noninfectious vaccine administered at a 2- to 4-week interval are necessary. The first vaccination is a priming,



Crowd cattle in a lane chute to properly administer injections in the neck.

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sensitizing dose that may provide no protection or a low protection for 1 to 4 months. The second vaccination is a required booster dose, recommended within 2 to 4 weeks but acceptable within 4 months after the first dose. Immunity following the second dose lasts from 6 to 12 months. To maintain immunity, the vaccinated animal should receive semiannual or annual boosters, depending on the type and risk of disease. The booster vaccine is a noninfectious vaccine.

INFECTIOUS VACCINES

The virulence of an organism in a live vaccine is modified or reduced (attenuated) so that it no longer causes disease, but it is able to infect and replicate. Some live vaccines may possess the ability to revert to a virulent organism and spread disease to unvaccinated cattle.

A modified live vaccine is an infectious vaccine that establishes a desired infection in the vaccinated animal. Immunity prevents the desired infection of a modified live vaccine from being established; therefore an infectious vaccine generally is not effective when administered after a noninfectious vaccine.

The infectious vaccine may give properly vaccinated cattle immunity for life. Repeated modified live infectious vaccinations are unnecessary. However, immunity of the vaccinated animal can be ensured by using a noninfectious vaccine booster every year or an infectious vaccine every 3 years.

Infectious vaccines include modified live vaccines that are not body temperature sensitive and modified live vaccines that are chemically altered, body temperature sensitive, and injected in the nasal passage.

HANDLING VACCINES

All vaccines should be refrigerated. Remove only briefly for dose measurement and administration. Do not expose the vaccine to direct or indirect sunlight for any extended period of time. Sanitary measures help to ensure the vaccine is free of blood, feces, hair and dirt. If handling a live vaccine, do not use chemicals to disinfect syringes, needles, skin or vaccine vials. The unused portion of a vial of vaccine must be properly discarded and not stored for later use.

PROPER VACCINATION PROCEDURES

Follow label directions for proper procedures in administering a vaccine. Use the correct dose and route of administration. The measured volume (dose) of a vaccine is in milliliters (ml) or equivalent in cubic centimeters (cc). The routes of administration are subcutaneous or SQ (inject under skin), intramuscular or IM (inject in muscle), and intranasal or IN (inject in nasal passage). The recommended site for SQ or IM injections is in the side of the neck in front of the shoulder. Do not administer an expired vaccine. Follow the withdrawal time recommendations for slaughter printed on the label.

Systemic protection provided by colostral immunity in calves lasts from 2 to 12 weeks and depends on the quantity and quality of colostrum (first milk) consumed, the disease, and the level of exposure. As this immunity decreases, young calves should be actively immunized by use of vaccines. However, maternal antibodies interfere with active immunity by reducing the effectiveness of administered vaccines. Because the exact time of colostral immunity loss cannot be predicted, young calves must be vaccinated at least twice, beginning at 2 months of age, to ensure successful active immunization.



A subcutaneous injection should be given in the side of the neck in front of the shoulder.

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