Vaccination Vitals

The success of a vaccination program in improving health and preventing disease begins with proper handling and administration of vaccines.

Story by
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Have you ever heard someone complain that they vaccinated their calves and the animals still got sick? Or maybe it's happened in your herd. What's the reason?

The leading factor causing vaccines to be ineffective is mismanagement in handling and administering the product. Fortunately, with attention to detail, these management errors can be corrected to achieve optimal effectiveness of the vaccine.

Directions and dosage

To start, reading the instructions provided by the manufacturer is critical for proper usage of the vaccine. The product label includes information about dosage, route of administration, mixing instructions (if applicable), storage requirements and the need for booster doses. Specific requirements and/or restrictions regarding use of the vaccine are also provided.

For instance, without reading the instructions, vaccines may be improperly administered by a route not indicated on the label. This can result in the vaccine being given at the wrong site or via the wrong injection technique — and vaccines can reach their optimal effectiveness only when given by way of the label-recommended route of administration.

Another example of improper vaccine usage is administration to animals of a species, age or sex that is out of compliance with label specifications. Following the label recommendations is important because some pathogens are species-specific, and using a vaccine in an inappropriate species may not produce the desired protection. Moreover, age restrictions are the result of vaccine research and are in place to minimize maternal antibody interference.

Additionally, reading the vaccine instructions can help prevent administering antibiotics that might be contradictory with the vaccine. This is primarily a concern when antibiotics and modified-live bacterial vaccines are used together. This situation can be avoided simply by checking the vaccine label.

Two other management mistakes with dosage are partial dosing and failing to administer the second dose of a two-dose regimen.

Partial dosing may be done as a cost-cutting measure, because the user believes the recommended dose is too high for the size and age of the animal, or because the vaccine instruction sheet was not read. However, partial dosing decreases the immune response. Keep in mind that vaccine doses are set at a level that has been confirmed to stimulate a protective immune response in the species for which the vaccine has been developed. The dose level generally is not size-dependent.

Failing to administer the second dose of a two-dose regimen undermines product effectiveness because many vaccines require a booster dose to achieve peak levels of immunity. For the vaccine to work properly, two doses must be administered and, equally important, timing of administration must be in compliance with the label-recommended schedule. If the booster dose is given too soon after the first dose, the immune response is lost in the initial response. If the booster dose is given too late after the first dose, the population of memory cells from the primary dose decreases significantly, diminishing the immune response.

Handle with care

Vaccine effectiveness also depends largely on proper handling procedures prior to administration. While handling guidelines are often simple, they are frequently overlooked or ignored.

Foremost, vaccines must be stored according to label directions and should not be used if they become frozen or are exposed to high temperatures. Freezing or overheating disrupts the integrity of vaccine antigens and may degrade vaccine adjuvants. Thawing or recooling does not ensure that vaccine integrity will be restored. Thus, if there is any doubt about how the vaccine was stored, the product should not be used.

Along with vaccine storage, be sure to watch product expiration dates. If a vaccine is outdated, it will likely be ineffective and should not be used. Here's why: When a vaccine is developed, efficacy studies are performed with product produced at an established minimum immunizing dose (MID) level. The MID represents the least amount of antigen that is required to initiate desired levels of immunity when the vaccine is administered properly. The MID also stands for the amount of antigen that should be present in a vaccine dose at the product's expiration date. After that date the vaccine's antigenic level may continue to decrease and, ultimately, may be inadequate for establishing protection.

Mixing mistakes

Mismanagement when the vaccine is being administered can decrease vaccine effectiveness, but it may also lead to unwanted adverse reactions and injection-site problems. Details to consider chuteside include the following.

- Equipment used for mixing and drawing vaccines out of a bottle must be sterile. Even small amounts of disinfectant can inactivate modified-live virus (MLV) vaccines, and harsh disinfectants may break down the antigens in inactivated vaccines. Thus, syringes must be new or clean and free of disinfectant residue. If a disinfectant is used at the end of a vaccination session, thorough rinsing with sterile water is required to remove all traces of the disinfecting agent.
- Following reconstitution (mixing of the vaccine), modified-live virus (MLV) vaccines require special care because they are extremely sensitive to sunlight and heat. These vaccines should be kept cool and used as soon as possible after mixing.
- When multiple vaccines are administered simultaneously, the syringes for each vaccine should be identified and kept separate. Pulling vaccine into a syringe previously used for another vaccine can lead to problems of mixing incompatible vaccines.
- Avoid the unapproved mixing of vaccines. Many killed-antigen vaccines inactivate live viruses, either because of their adjuvants or because of disinfectants used for inactivation and storage of these products. The unapproved mixing of these vaccines with modified-live viruses inactivates the attenuated viruses and renders them ineffective. It also may create an increased potential for injection-site lesions. Thus, only approved vaccines and diluents should be combined. Combination vaccines are tested to ensure that the various components work together and that there is little to no interference between the components.
- All vaccine labels advise immediate product use once the vaccine is opened. Storing opened product increases the risk that contaminants will grow inside the bottle and that vaccine degradation will occur. Without question, all MLV vaccines must be used immediately; this is a good rule of thumb to follow for all vaccines.

Following these guidelines can help ensure your vaccination program is optimally effective. It may take a little extra time to do things right, but the performance payoff is worth the effort.

Editor's Note: *Vic Cortese is an associate director of cattle immunology with Pfizer Animal Health, which supplied this article. He is also a diplomate of the American Board of Veterinary Practitioners.*