

Why do vaccines fail?

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Submitted to: Cattle Business Magazine, May 2013

“But she was vaccinated, Doc!” Every year around this time I hear these same words, maybe from different ranchers in different situations. Maybe they’re experiencing a respiratory outbreak in their calves, or have seen a few abortions in mature cows. But the bottom line remains the same: Often we think that vaccinating our cattle is some sort of insurance. Unfortunately, we commonly see “vaccination failures” that make us wonder why our cattle are getting sick even if they were vaccinated, or if we’re getting our money’s worth by purchasing the products.

As we come into spring and start turning our cattle out to greener pastures, it’s important to ensure we are providing them with the most effective protection as possible. A true vaccine failure occurs when an animal fails to develop an adequate immune response that is sufficient to protect that animal from disease following vaccine administration. However, many times it’s not the fault of the vaccine, but rather the circumstances surrounding the vaccination process. Vaccine failure can occur for many reasons.

Improper selection

Select the appropriate vaccine for the class of animals, the stage of production, and the disease against which you are trying to protect. A vaccine contains antigen made from a specific disease-causing organism that the animal mounts an immune response to. Therefore, it is important that the vaccine contains the proper antigen that you are trying to protect against. Furthermore, some disease-causing organisms may have several strains or serotypes, and vaccines may not be cross-protective for all types and strains. A good example of this can be found with leptospirosis. While many combination leptospirosis vaccinations are available, protection against some abortion-causing strains such as *Lepto hardjo- bovis* require a separate vaccine.

In addition to choosing the proper antigen, choose high-quality vaccines that have been proven to be safe and effective by the USDA. Avoid buying the cheapest off-brand vaccine that may have low quality or contamination issues. Remember, you get what you pay for. Stick to the major manufacturers who have good reputations and extensive quality assurance programs.

Improper timing



Vaccines can “fail” for many reasons:

- Improper selection
- Improper timing
- Improper administration
- Improper handling and storage

Maternal antibodies that the calf receives through the colostrum can last for several months. Vaccination during this time may interfere with the calf's ability to mount his own immune response. For this reason, most vaccines are given after several months of age. The exact timing of these first vaccinations can vary and often depend on other management practices such as branding or pregnancy checking, as well as the immune status of the dam.

It takes several weeks for an animal's immune response to provide full protection following vaccination. Remember that animals can still get sick during the time that immunity is building, so we need to plan ahead. For calves, this can mean vaccinating several weeks prior to weaning and commingling in order to give them the best protection during their highest risk period. Stress decreases an animal's immune response, therefore we want to avoid vaccinating during other high periods of stress as well if at all possible. In mature cows, we want to vaccinate with some of the reproductive antigens pre-breeding in order to give them the best protection prior to the breeding season.

Finally, don't forget boosters, especially in calves, or animals who are receiving a specific vaccine for the first time. The first vaccine in a naïve animal is meant to "prime" the immune system, and the second vaccine gives it the boost of antigens it needs to provide a more complete immune response. Vaccines do not ensure lifetime immunity, so annual or semi-annual boosters are also needed for mature animals.

Improper administration

Good animal restraint is essential to properly administering any vaccine. Vaccines have been designed to work in specific sites under specific conditions: if a product is labeled for subcutaneous (sub-Q) injection, it must be given subcutaneously and not intramuscularly (IM), and vice versa. Follow the label carefully and administer the product according to label.

If giving multiple vaccinations, space them at least 4 inches apart. While not usually a concern with common vaccine products, never give more than 10cc of a product in the same site. Don't forget some of the basic Beef Quality Assurance recommendations: If a product is labeled for either SQ or IM, give the injection SQ, and always in front of the shoulders. Never, ever mix two different vaccines in one syringe.

Improper handling and storage

Vaccines are biological products that can be sensitive to environmental conditions. Always check the expiration date on the bottle and discard outdated vaccine. Vaccine products must be kept cold and out of direct sunlight. Keep a cooler on hand when transporting vaccine or when working cattle. If using modified-live virus products (MLV), use the entire bottle shortly after being reconstituted. A good rule to follow is to only mix enough product that you will use within an hour. Use transfer needles when mixing vaccine and avoid going into a bottle multiple times with a needle to decrease product contamination. If only working a small number of animals, use the smaller dose bottle first.

Needle and syringe care are also important when vaccinating animals. When using a multiple-dose syringe, inspect all parts and make sure it is cleaned and calibrated properly. When using a disinfectant for your needles between animals, only disinfect needles being used with killed vaccine products since disinfectants can inactivate modified-live vaccine components.

Remember that no vaccine is 100% protective, and vaccination is only part of a preventative cattle health program. A good vaccination program cannot overcome poor management. Your herd veterinarian can help you develop a comprehensive herd health management program to avoid future vaccine failures. For good cattle health, give the right vaccine, at the right time, in the right way.