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GETTING THE MOST OUT OF A VACCINE PROGRAM

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Vaccination programs have long been touted to be the answer to all your cattle disease problems. It isn't that way. Vaccination is only one of many tools that producers and ranchers have at their disposal to try and manage an efficient and profitable operation. There are many other tools at their disposal.

When discussing vaccines, I have a favorite quote from Dr. Tim Richards at Kamuela, HI. He was the veterinarian for Parker ranch, the largest ranch in the United States. When Dr. Richards made that quote, Parker ranch was sending their feeder cattle by boat to the mainland for finish feeding. At that time Parker feeder cattle were experiencing a morbidity rate $<1.5\%$ and a mortality rate $<0.8\%$. These are fantastic rates. How did they get them so low? Dr. Richards said "All my health programs start with nutrition." He is absolutely right. As a veterinarian I can not overcome substandard nutrition with a bunch of vaccines. We need to have an animal at an above adequate plane of nutrition if we expect them to have an above average response to a vaccine.

I view vaccinations as a form of risk management. To me vaccines are much more like an insurance policy, except there are a lot more things I can do as a rancher or producer to make that insurance policy more effective. For instance, is the vaccine a killed product or a modified-live vaccine? Killed products are very safe. Though for a killed product to have any chance at providing protection, you have to give two doses. A modified-live product can be very effective, but if you use it on a naïve pregnant cow, you can abort the fetus. Which one to use? This is where you need to talk to your local veterinarian about your operation and what would fit in best with your management scheme. Again, vaccines are only one tool that can be used to bring profitability to your operation.

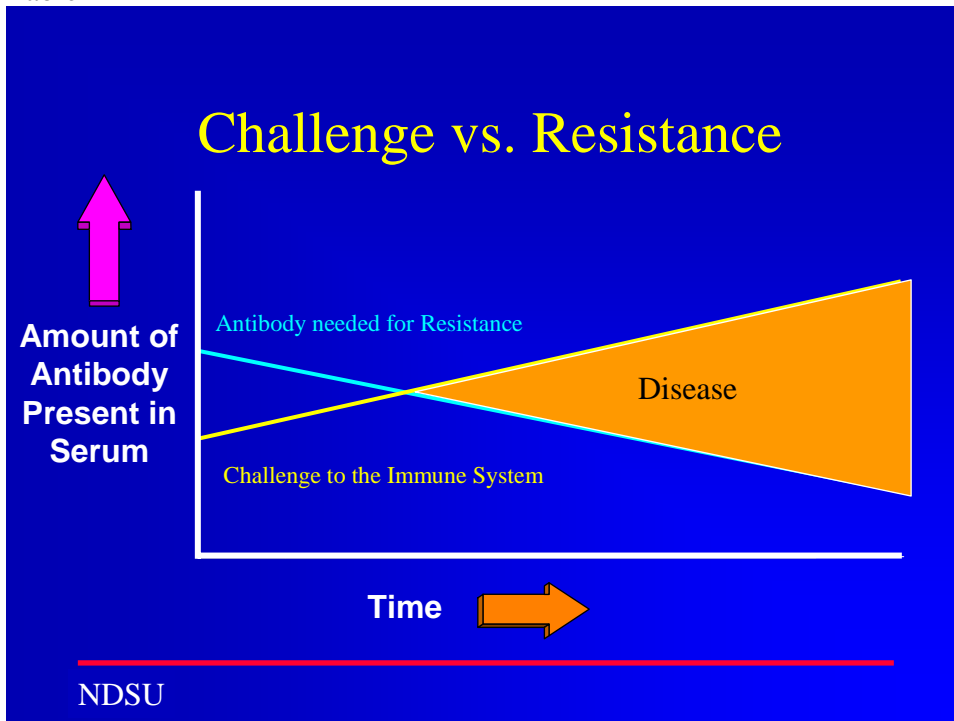
The only thing that keeps us alive is that fact that our immune systems have more resistance to all the challenges life has to throw at us, most of the time. It's when the challenges of life overwhelm our immune system that we get sick. It is the same for cattle. Table 1 below illustrates how our resistance to disease is greater than the challenges it faces.

Table 1



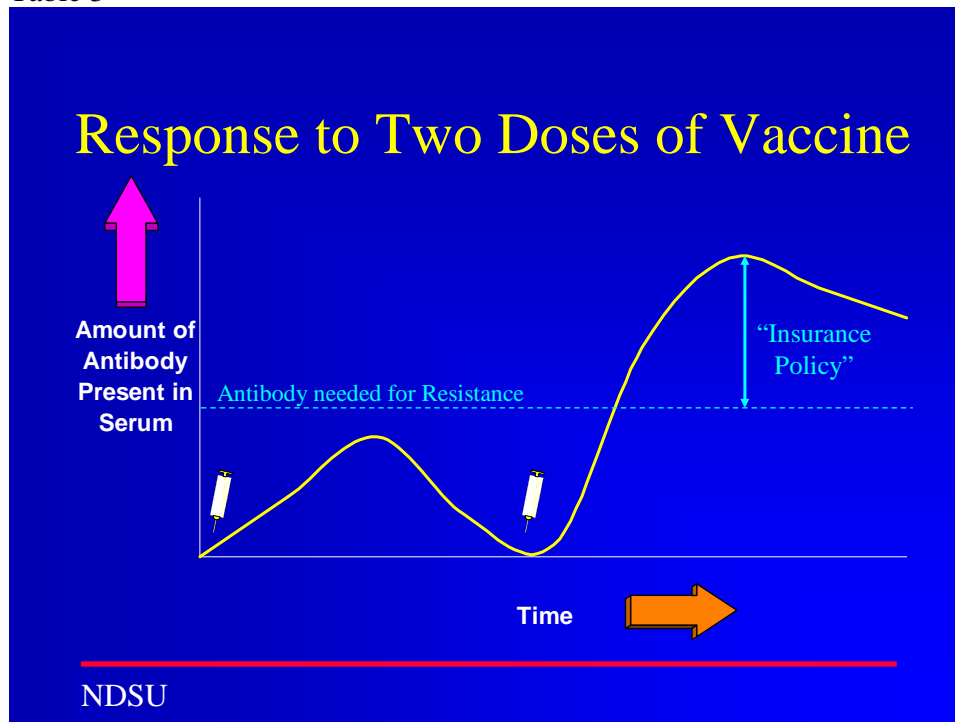
When something occurs to upset this balance between challenge and resistance, then disease can occur. If an animal's immunity becomes lowered or if the challenges to the animal become greater, disease usually follows. This is illustrated in Table 2.

Table 2



The best way to prepare an animal's immune system to resist a challenge is through the use of vaccines. Normally it takes at least two doses of a vaccine to establish a sufficient immune response to protect an animal. The first dose is known as the priming dose. This dose introduces the antigen (challenge) to the animal for the first time. The animal will mount an initial immune response, but it will usually not be of sufficient quantity to protect the animal. The second dose is known as the booster (anamnestic) dose. This dose builds on the first dose by using the animal's immune system memory response. This second dose will usually cause an immune response of sufficient quantity to provide a level of protection for the animal. This concept is demonstrated in Table 3. It should be noted that even if an animal is appropriately vaccinated, a massive challenge can override an immune response on the part of an animal and still cause disease. It can not be stressed too much that the use of vaccines is just one tool to be used in a complete management system.

Table 3



Vaccines can fail due to a number of reasons such as:

- Animal was already incubating the disease.
- Passive transfer interference.
- Wrong vaccine for condition was used.
- Vaccine was administered incorrectly.
- Vaccine was temperature abused.
- Vaccine was outdated.
- Animal can not mount an appropriate response.

An animal's inability to mount an appropriate immune response is probably one of the most important aspects of a vaccination program, and is probably the most easily overlooked. Why can't the animal mount an appropriate response to the vaccine? The animal may already be incubating the disease. We often see this with regards to bovine respiratory disease (BRD). Cattle need their first dose of vaccine at least 7-10 days before it is exposed to a respiratory pathogen. And in most cases, the animal will need at least two doses of a vaccine for an adequate immune response.

In my view, the primary reason an animal can not mount an appropriate immune response is stress. Stress can be defined as any event that tends to disturb an animal's normal physiologic state. Weaning and transportation are a classic example of events that stress an animal. Stress has many factors that may include inclement weather, off feed or lack of feed and water, exposure to a heavy pathogen load, other stress inducing procedures such as dehorning and castration, and animal handling procedures. Stress in an animal causes a number of physiologic events, one of which is the release of cortisol. Cortisol serves many important functions including immunosuppression. The more stress an animal is exposed to, the more cortisol released by the adrenal cortex. This prolonged release of cortisol may set up the animal's immune system for failure.

There are a number of good vaccines available for protecting cattle. Which one to use on what type of cattle? The following recommendations are excerpted from *Large Animal Internal Medicine, 3rd Edition, Bradford Smith, Mosby, 2002, pgs 1406-8.*

Vaccines for Adults Beef Cows

Highly Recommended

- Infectious bovine rhinotracheitis (IBR) vaccines
- Bovine virus diarrhea (BVD) vaccines
- *Leptospira pomona* bacterins
- Campylobacteriosis bacterins

May be useful in specific herds

- *Tritrichomonas foetus* vaccine
- Rotavirus-coronavirus vaccine
- *Eschericia coli* bacterins
- Anthrax spore vaccine

Vaccines for Adults Beef Bulls

Highly Recommended

- Infectious bovine rhinotracheitis (IBR) vaccines
- Bovine virus diarrhea (BVD) vaccines
- Campylobacteriosis bacterins

May be useful in specific herds

- *Tritrichomonas foetus* vaccine
- Anthrax spore vaccine
- Rabies vaccine

Vaccines for Beef Calves

Highly Recommended

- Infectious bovine rhinotracheitis (IBR) vaccines
- Bovine virus diarrhea (BVD) vaccines
- Bovine respiratory syncytial virus (BRSV) vaccine
- Parainfluenza type 3 (PI3) vaccine
- *Leptospira pomona* bacterins
- Brucellosis vaccine* (replacement heifers only)

May be useful in specific herds

- *Mannheimia haemolytica* (pasturella) bacterin
- *Histophilus somni* (haemophilus) bacterin
- Clostridial bacterins
- Anthrax spore vaccine

Vaccines for Stocker Cattle

Highly Recommended

- Infectious bovine rhinotracheitis (IBR) vaccines
- Bovine virus diarrhea (BVD) vaccines
- Bovine respiratory syncytial virus (BRSV) vaccine
- Parainfluenza type 3 (PI3) vaccine
- *Leptospira pomona* bacterins
- *Mannheimia haemolytica* (pasturella) bacterin

May be useful in specific herds

- *Histophilus somni* (haemophilus) bacterin
- Clostridial bacterins
- Anthrax spore vaccine

Vaccines for Replacement Heifers

Highly Recommended

- Infectious bovine rhinotracheitis (IBR) vaccines
- Bovine virus diarrhea (BVD) vaccines
- *Leptospira pomona* bacterins
- Campylobacteriosis bacterins

May be useful in specific herds

- Brucellosis vaccine
- *Tritrichomonas foetus* vaccine
- Rotavirus-coronavirus vaccine
- *Escherichia coli* bacterins
- *Mannheimia haemolytica* (pasturella) bacterin
- *Histophilus somni* (haemophilus) bacterin
- Clostridial bacterins
- Anthrax spore vaccine

Vaccines for cattle entering the feedlot

Highly Recommended

- Infectious bovine rhinotracheitis (IBR) vaccines <Essential>
- Bovine virus diarrhea (BVD) vaccines
- Bovine respiratory syncytial virus (BRSV) vaccine
- Parainfluenza type 3 (PI3) vaccine
- *Leptospira pomona* bacterins
- *Mannheimia haemolytica* (pasturella) bacterin

May be useful in specific herds

- *Histophilus somni* (haemophilus) bacterin
- Clostridial bacterins
- Anthrax spore vaccine

There are certain situations when care must be exhibited in selecting and administering vaccines. Administering a modified-live strain of infectious bovine rhinotracheitis (IBR) to naïve pregnant cattle or to their suckling calves can result in catastrophic abortion losses. Though reported cases of this happening are becoming rare, they do still happen. To prevent the possibility of these abortions, you should either vaccinate the cows and replacement heifers when they are not pregnant, or use a killed vaccine.

Modified-live bovine virus diarrhea (BVD) vaccines should not be given to pregnant females. There are reports that these vaccines can cause the same congenital defects in the fetus as the field strain of BVD.

In the few isolated areas where anthrax occurs, care should be taken not to give an antibiotic concurrently with the anthrax spore vaccine. Anthrax is a bacteria and the administration of a vaccine concurrently with the vaccine may inactivate or reduce the immunogenic effects of the vaccine. If antibiotics are administered in the midst of an anthrax outbreak, the animals should be re-vaccinated in 5-10 days.

Vaccines are just one of the tools available to the producer and rancher to enhance profitability. The animal must have a fully functional immune system in order to get the most out of your vaccination program. Animal handling, animal delivery and environmental conditions must be designed and modified to reduce stress on cattle. Utilize your local veterinarian to customize a vaccination program that will fit your management system.