University of Nebraska - Lincoln
DigitalCommons@University of Nebraska - Lincoln

Range Beef Cow Symposium | Animal Science Department

1-1-2011

Vaccination: What the Heck am I doing?

G. L. Stokka
Doctor of Veterinary Medicine

Follow this and additional works at: http://digitalcommons.unl.edu/rangebeefcowsymp

Part of the Animal Sciences Commons

Stokka, G. L., "Vaccination: What the Heck am I doing?" (2011). *Range Beef Cow Symposium.* Paper 301.
http://digitalcommons.unl.edu/rangebeefcowsymp/301

This Article is brought to you for free and open access by the Animal Science Department at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Range Beef Cow Symposium by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Vaccination: What the Heck am I doing?

G.L. Stokka DVM, MS

The use of vaccines and vaccination in general can be a very confusing topic. There are literally hundreds of different vaccines available for use by beef producers, with multiple antigens and differing levels of effectiveness and safety. Veterinarians serve a critical function in making proper recommendations based on individual herd objectives and assessment of risk of exposure and economic loss. However, there is a lack of objective peer reviewed literature to assist the practitioner and beef producer in this area. The purpose of this paper is to bring some sense of philosophy, science and logic to this topic. Management keys to enhancing response to vaccination would be:

1. A genetic base that enhances transfer of colostral immunity and reduces stress.
2. Calving and handling livestock during times of decreased environmental stress.
3. Meeting nutritional demands for the cow during pregnancy and for the calf during periods of higher stress.
4. Handling all livestock with a keen practical knowledge of low stress handling techniques.
5. Reducing exposure to pathogens from outside sources or what we would call biosecurity measures.

Philosophy:

There are 3 questions to be addressed as to whether to vaccinate or not.

1. Is vaccination necessary, in other words is there a reasonable expectation of exposure or economic loss associated with a specific organism? A corollary to this may be the cost of vaccination insurance is so minimal that leaving it out during normal herd working events does not make sense.
2. If the vaccination is necessary, is there a vaccine that has been demonstrated to be effective? Depending on the risk of exposure and the perceived economic risk an additional thought process that takes place. That is, the level of effectiveness or protection desired. There is the highest protection available in a vaccine, or the best, there is a level that is less than the highest protection or < best and finally there is a lower protection, or better than nothing. An example of this is the use of a killed BVDV vaccine to protect pregnant cows from the consequences of BVDV exposure. Modified live virus vaccines have been shown to provide superior levels of protection than have the killed virus vaccines. This decision would then be using the best vs. better than nothing depending on herd working events and the opportunities for booster doses.
3. Finally, are the vaccines safe to use in all classes and ages of cattle? Do they create minimum tissue reactions and rare systemic vaccine reactions.

Vaccines with adjuvants will cause some level of tissue reactivity and repeated doses will increase the tissue damage. Also, although rare vaccines may cause hypersensitivity reactions.

If the decision to use vaccines has been made then a SOP must be developed to reduce the risk of vaccine handling resulting in reduced effectiveness. Three things can impact vaccine effectiveness:

1. Temperature, both high and freezing temperatures will reduce the effectiveness of vaccines
2. Direct Sunlight will inactivate reconstituted modified live virus
3. Mixing of adjuvanted and reconstituted vaccines is critical to putting the proper antigens into solution such that the proper mix is delivered to the animal. Violent shaking or mixing should be avoided as some constituents may be destroyed or damaged.

Science:

The term vaccination is derived from the Latin term *vacca* which means cow. This word was used to describe a vaccine used in people to control the disease caused by the smallpox virus. The antigenic material in the vaccine was from the cowpox virus, obviously from cattle, which was presumed to provide at least partial protection against the smallpox virus.

It is important to understand that vaccination does not equate with immunization. In order for immunization, that is an immune response that equates with protection, to develop, three things must occur.

Number 1; the immune system must recognize the vaccine that has just been presented to the animal.

Number 2; the immune system must be activated

Number 3; the immune system must produce an effect or a protective response.

For this response to take the place, the animal must be what we call immunocompetent. This simply means that the animal must have the innate and specific ability to respond to a vaccine and or pathogen challenge.

A vaccine given to a immunocompetent animal, whether by the parenteral (subcutaneous or intramuscular) or the intranasal route of administration will be picked by cells in the body that we call antigen processing or could be called vaccine presenting cells. These cells have the unique and amazing ability to process parts of the vaccine and present specific pieces of the virus or organism to other immune cells, which then directs the immune response to produce primarily antibodies and or a cell mediated response which results in killer T cells, that is, cells whose primary function is to kill cells within the animal that are infected with the virus. Following vaccination a population of memory cells will also be created to respond either to a booster dose given within weeks or months following the first dose. In contrast to modified live vaccines which replicate and more closely mimic the natural exposure, killed vaccines do not, thus when using killed vaccines particularly in young animals it is critical that a booster dose be given to boost the initial or primary dose.

Logic:

What to use and when to use vaccination cannot be determined without assessing the risk of exposure and the objectives and marketing structure of the producer. The list I will share here are some very basic vaccination strategies for the beef cowherd. They reflect personal use in our herd and our assessment of risk.

The list of viral pathogens for what I believe to be essential to purchase vaccination insurance are; IBR (infectious bovine rhinotracheitis, "Red Nose"), and BVDV (bovine virus diarrhea virus). Options here would include BRSV (bovine respiratory syncytial virus) given to the cowherd to reduce transmission and spread of this respiratory pathogen within the herd. Bacterial pathogens include the common lepto serovars, Canicola-Grippotyphosa-Hardjo-Icterhaemorrhagiae and Pomona. In specific herds at risk of lepto Hardjo bovis a vaccine to protect against this serovar may be used. In addition, most combination vaccines will include Campylobacter fetus (vibrio) in lepto vaccines, this organism is rarely diagnosed as a cause of pregnancy loss, but may still occur in certain areas.

Replacement heifers:

A Modified live IBR and BVDV pre-weaning, weaning, pre-breeding, killed 5-way Lepto bacterin pre-breeding which follows a priming dose given sometime earlier. Vibrio may or may not be included.

Mature Cows:

Annual modified live (MLV) IBR, BVDV along with lepto pre-breeding. Vibrio may or may not be included.

Pregnant cow vaccination – follow label recommendations to the letter.

Young and Mature bulls:

See above

Calves:

Branding or turnout - IBR, BVDV, BRSV, PI3 (MLV), 7-way Clostridial
Option – Mannheimia hemolytica

Pre-weaning – IBR, BVDV, BRSV, PI3 (MLV), Mannheimia hemolytica, 7-way Clostridial

Weaning – IBR, BVDV, BRSV, PI3 (MLV), Mannheimia hemolytica

Summary:

The topic of vaccination can be confusing. Utilize your veterinarian to help you make the correct choices regarding products, timing and handling of vaccines.