

Building the Immune System of Calves

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Introduction

Vaccination programs are an integral part of a total herd health program. Every producer needs to consult their Veterinarian to design a vaccination program that fits the need of their specific operation and management practices. A vaccination program is much more than "sticking a needle in and squeezing the handle." To understand how a vaccination program works, a basic understanding of how vaccines function and how the immune system responds to a vaccine is needed. This greatly depends on the type of vaccine used, the route of administration and the timing of the primary and booster vaccination.

Vaccines and Vaccinating

Most vaccines contain either the disease causing agent in a modified form (MLV) or components of the agent (killed). The piece or area of the agent that stimulates an immune response is called an antigen. This antigen is presented to the immune system in a variety of ways depending on the type of vaccine and route of administration. When presentation of the antigen occurs for the first time, either due to primary vaccination or exposure to disease, the immune response is focused on forming memory cells. Memory cells are specific cells that allow the body to respond quickly if the antigen is presented at a later date. The development of memory takes most of the immune response, so only a small amount of disease resistance (antibodies) is formed following first exposure to the disease or vaccine. Some memory cells have a long life span; others have a shorter life span. This is why timing of the vaccination is so important. Booster vaccinations create a much larger and longer duration immune response because memory has already been created. This is why one vaccination is usually not protective and a booster is required for most vaccines. The idea is to stimulate the immune system so antibodies are present at a level in the body that is protective if exposure to disease occurs. Disease can occur if exposure exceeds the animal's protective level for that disease.

So why do vaccinated animals still get sick? The most common reason is that the animal failed to fully respond to the vaccinations due to stress, improper vaccine type, timing or route of administration, or improper handling of the vaccine. Some vaccines, especially MLV's, must be handled very carefully. Exposure to heat or sunlight, or being mixed too long prior to use can reduce a vaccine's effectiveness. All vaccines must be kept cool...even while using. Nevertheless, when everything is done correctly, some animals fail to mount or create a sufficient immune response to disease. Factors contributing to this failure are stress, poor nutrition, micro and macro mineral imbalance or deficiency, low blood protein, and poor overall health.

Calf Vaccination Guidelines

An important component of a herd health program is the calf vaccination protocol. The accompanying figure outlines three approaches to vaccinating calves. Regardless of the vaccination schedule used, administration of a 7- or 8-way Clostridial (Blackleg) vaccine plus a MLV vaccine to begin developing immunity against respiratory disease are recommended at branding.

Option A is the preferred program, but it may not be compatible with the management system in place on all ranches. This option is for calves that are weaned on the ranch at least three weeks after weaning (45 days is recommended). Research from New Mexico State University on over 800 calves from 48 sources showed that separating weaning and feedlot entry by 41 days or more produced greater net return in the feedlot than when calves were shipped to the feedlot less than 40 days after weaning. These findings support the premise behind keeping calves at the ranch for 45 days or more post-weaning.

Option B is for calves processed three to four weeks prior to weaning, then shipped the day of weaning. This option is preferred over Option C because it allows time for the calves to develop their immune system in response to the booster vaccinations received two to three weeks before weaning. With this approach, calves are more capable of handling the stress from weaning and shipping combined with the stress and disease challenge inherent to commingling.

Option C is a good approach to calf vaccination when it is not practical to gather prior to weaning. When employing Option C, calves should not be shipped until three to five days after weaning because it is not as effective to vaccinate calves if they are weaned and shipped on the same day unless an intranasal vaccine is used at least six hours prior to shipping.

If calves are weaned and shipped on the same day without administering a booster vaccine, then they should be vaccinated at branding with a 7- or 8-way Clostridial, a MLV (or chemically altered) IBR, BVD, PI3, BRSV (i.e., common viruses associated with bovine respiratory disease complex), and a Pasturella vaccine. If this is the case, the Pasturella vaccine and the viral vaccine must be given on opposite sides of the calf's body and according to label directions.

Summary

Vaccination is the best tool we have to prepare the animal's body to respond to disease challenge. A sound herd health program developed with your Veterinarian, and adherence to proper vaccination techniques and timing are critically important to your herd. Consult your veterinarian for specific health program recommendations and for guidance on choosing pharmaceutical products, especially when using modified live products. It is also important to always follow label directions and Beef Quality Assurance guidelines when processing calves.

Figure 1. Calf Vaccination Guidelines

Calf Option A (Preferred)

BRANDING

- > Clostridial 7-way
- > MLV – IBR, BVD, PI3, BRSV

WEANING: (let calves sit overnight before processing)

- > MLV – IBR, BVD, PI3, BRSV
- > Pasturella
- > Deworming

POSTWEANING: (3-4 weeks after initial vaccinations)

- > MLV – IBR, BVD, PI3, BRSV
- > Clostridial 7-way with H. Somnus
- > +/- Pasturella

Calf Option B

BRANDING:

- > Clostridial 7-way
- > MLV – IBR, BVD, PI3, BRSV

PREWEANING: (3-4 wk prior to weaning)

- > MLV – IBR, BVD, PI3, BRSV
- > Clostridial 7-way with H. Somnus
- > Pasturella
- > Deworming

Calf Option C

BRANDING:

- > Clostridial 7-way
- > MLV – IBR, BVD, PI3, BRSV
- > +/- Pasturella

WEANING: (let calves sit overnight before processing)

- > MLV – IBR, BVD, PI3, BRSV
- > Clostridial 7-way with H. Somnus
- > Pasturella
- > Deworming

Note: Consult your veterinarian for specific health program recommendations and for guidance on choosing pharmaceutical products, especially when using modified live products.