

Effective Use of Vaccinations on Cow/Calf Operations to Reduce Incidence of Bovine Respiratory Disease

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Bovine Respiratory Disease Complex Series



FAST FACTS

- Vaccinating cattle for BRD pathogens can specifically enhance the immune response to those pathogens.

Bovine respiratory disease complex (BRD) is the most economically damaging disease of beef cattle in North America (Griffin 1997). An appropriate immune response to the infectious agents (pathogens) that cause BRD is thought to be an important factor that leads to decreased incidence of BRD in cattle. Vaccinating cattle for BRD pathogens can specifically enhance the immune response to those pathogens. The cost of vaccinating cattle can be considerable and thus it is important that producers implement strategies to make vaccine programs as effective as possible. The focus of this article is to make appropriate use of vaccinations to strengthen the immune response to help your cattle fight off BRD pathogens.

How do vaccines work? To vaccinate an animal antigenic material is administered to the animal to stimulate the immune system to be able to fight off disease causing organisms that may invade that animal in the future. Commercially available BRD vaccines come in 2 main forms. There are killed (inactivated) vaccines which are viruses or bacteria that are inactivated to prevent them from causing disease in the animal, but yet still stimulate the animal's immune system to prevent disease. Modified live vaccines (MLV) are live viruses or bacterium that have been modified so that they do not cause disease in the vaccinated animal, but still produce immune responses to fight off the disease causing organism. Choosing which type of vaccine to use may depend on veterinary recommendations or timing restrictions specific to your operation. It is helpful to understand the advantages and disadvantages of each type of vaccine when making those decisions. The advantages and disadvantages are listed in Table 1 and 2.

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Table 1. Advantages and disadvantages to killed vaccines.

Advantages	Disadvantages
Safe in pregnant animals	Often requires more than one dose
Will not revert back to virulent form	May not have as strong of a response
Will not shed the virus	May not stimulate all phases of the immune response (West 1999)
Will not cause immunosuppression	Hypersensitivity (allergic type) reactions

Table 2. Advantages and disadvantages to modified live vaccines.

Advantages	Disadvantages
Longer lasting responses (Ellis 1992)	Potential for vaccine induced disease (rare)
Stronger responses (Ellis 1992)	Vaccinal virus can be shed by animal
Parenteral (Injection) or mucosal administration (intra-nasal)	Short shelf life once re-constituted
	Fragile (easily inactivated by improper handling)
	Possible risk to pregnant cattle
	Possible risk to pregnant cows suckling calves that have been vaccinated
	Can cause immunosuppression (Kelling 2007)

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- It is important to always follow the recommendations provided on the vaccine label.

The causative agents of BRD for which there are commercially available vaccines are: *Infectious Bovine Rhinotracheitis (IBR)* or *Bovine Herpes virus 1*, *Bovine Viral Diarrhea Virus*, *Parainfluenza-3 Virus*, *Bovine Respiratory Syncytial Virus*, *Histophilus somni*, *Mannheimia haemolytica*, *Pasturella multocida*, and *Mycoplasma bovis*. There are other viruses and bacterium that are considered to be involved in the BRD complex however; vaccines for these organisms are not commercially or readily available.

To effectively vaccinate cattle for BRD pathogens there are several factors that should be considered: vaccination timing, the health of the cows and calves being vaccinated, handling of the vaccines, and the frequency of the vaccinations.

The decision of when to vaccinate cattle to get the maximum effect from a given vaccine depends on several factors. First, it is important to always follow the recommendations provided on the vaccine label. If you are vaccinating pregnant cattle or calves suckling cows, make sure that the vaccine that you are using is safe for those animals. Some modified live vaccines have been shown to cause abortions when used in pregnant cows or calves suckling pregnant cows (Kelling 2007). Most vaccine companies offer modified live BRD vaccines that can be safely used in pregnant cows and suckling calves.



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- Maternal antibodies that are provided to the calf through colostrum (the cow's first milk) can last up to six months.
- The most common error that leads to gaps in vaccination programs is not following up the initial vaccination with a booster vaccination at the recommended time.

However, in order to be safe for these animals, most vaccine companies recommend that the cow must be vaccinated previous to breeding and within the last 12 months with the same MLV vaccine.

The first BRD preventive vaccines given to calves are usually administered around six months of age. Most manufacturers recommend that if the calf is vaccinated before six months of age the calf will need to be re-vaccinated after six months or before weaning for proper efficacy. The reason for this recommendation is that maternal antibodies that are provided to the calf through colostrum (the cow's first milk) can last up to six months. Maternal antibodies will often decrease the effectiveness of vaccine immune responses in calves.

As with most vaccine protocols the first vaccine given to calves should be tailored to the operation. If you have a high incidence of BRD in calves less than 6 months of age, it may be necessary to vaccinate younger calves or vaccinate cows prior to calving to increase BRD specific immunity in their colostrum. If a killed virus vaccine is being used, then a 2nd (booster) vaccination needs to be given typically 3 to 4 weeks after the initial vaccination. Ultimately this would be performed 3 to 4 weeks before weaning. The most common error that leads to gaps in vaccination programs is not following up the initial vaccination with a booster vaccination at the recommended time (Hjerpe 1996). When vaccinating replacement heifers, it is important to make sure that the heifer receives two doses of modified live virus vaccines previous to being bred for the first time. This allows use of that same MLV vaccine safely in bred animals from that time forward (this may depend on the specific manufacturer's recommendation of the vaccine being used). Cows should be vaccinated one to two times yearly preferably 3 to 4 weeks before breeding and again 3 to 4 weeks before calving to allow for ultimate protection during pregnancy and a high concentration of maternal antibodies for the calf. Understandably, gathering cows and calves this many times per year may not be realistic on some operations. These vaccination timing recommendations are offered to achieve the ultimate immune response for cows and calves to reduce the incidence of BRD. Modifications of the timing for vaccine application can be made through personal experience and working with your veterinarian.

BRD vaccination timing:

Calves:

After 6 months of age

If vaccinated before 6 months vaccinate again at 6 months or at or before weaning

If using killed virus vaccines, a booster dose will be needed 3 to 4 weeks after the initial vaccination

Heifers to be kept as replacements need two doses of the modified live vaccine to be able to use the vaccine safely during pregnancy



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- Cattle that are stressed or not healthy at the time of vaccinations may not have an adequate immune response.
- To effectively vaccinate cattle, appropriate handling of vaccines is a must.

Cows:

Vaccinate one to two times yearly

For fetal protection from abortive diseases 3 to 4 weeks prior to breeding is best

For passive transfer of maternal antibodies in colostrum to calves 3 to 4 weeks prior to calving is best

Bulls:

Once yearly 3-4 weeks pre-breeding

Cattle that are stressed or not healthy at the time of vaccinations may not have an adequate immune response. In fact, vaccinating cattle when they are sick can exacerbate their illness. Making sure that your animals have proper nutrition, are in good body condition, and have an adequate trace mineral status will improve your success of appropriate immune responses to vaccinations.

To effectively vaccinate cattle, appropriate handling of vaccines is a must. This is especially true with modified live vaccines. Modified live vaccines must be rehydrated just before use. It is very important to keep them cool before and during use. Some MLV are sensitive to direct sunlight as well. When syringes and bottles are not in use they should be kept in a cool place such as an ice chest. It is also important that vaccines be handled correctly previous to re-hydration or use as well. Most vaccines require refrigeration until use. It is usually recommended that they are used within several hours of rehydration. It is important to clean multi-use reusable syringes after use to avoid bacterial growth. It is also important that no disinfectant is left in the syringe that could deactivate some vaccines.

Summary:

There are many factors that go into appropriately using vaccines to boost your herd's immunity. The cost of vaccines and vaccinating cattle can be considerable, and they are only effective if used correctly. Thus it makes sense to spend some time to come up with a plan on how you are going to effectively vaccinate your herd. It may be a good idea to include your veterinarian, herd managers, and even workers who may be directly involved with the application of these vaccines. Topics that need to be planned would include which type of vaccine to use, when to give the vaccines to specific animals, and how to appropriately handle and give the vaccines to get the most benefit.

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