



Viral Vaccine Use in the Cow Herd

Viral vaccines help protect against reproductive losses.

by *Chris Thomsen*

The use of viral vaccines in mature cows is driven by multiple objectives including prevention of reproductive losses due to infectious diseases, prevention of respiratory disease and production

of high-quality colostrum. Several types of commercially available vaccines provide reproductive and respiratory protection including modified-live vaccines (MLVs), killed vaccines (KVs) and combination vaccines (CVs).

Devastating duo

Two of the most important viral pathogens for which vaccines are available to prevent reproductive losses are bovine viral diarrhea (BVD) virus and infectious bovine rhinotracheitis (IBR). These viruses affect the fetus differently depending on when the dam is exposed to them.

As shown in Figure 1, BVD causes clinical syndromes ranging from infertility to abortion. The most economically devastating effect is the formation of persistently infected (PI) calves. PI animals are disease carriers — they will have and shed BVD for life.¹ IBR can cause abortion as well as temporary infertility in nonpregnant females due to negative effects on the ovaries.

MLVs, KVs and CVs

MLVs offer superior protection from reproductive losses, stimulate cell-mediated immune responses, and provide a longer duration of immunity.² Still, there are restrictions to the timing of vaccine administration. Depending on the brand, MLVs are labeled to be given between 14 and 60 days prebreeding. Most MLVs are also labeled to be used in pregnant cows if the animal was vaccinated with an MLV within the last 12 months.

The MLV label claim “safe for use in pregnant cows” came from manufacturers wanting labels that allowed use of MLVs in calves suckling pregnant cows. To ensure post-vaccination shedding of IBR or BVD from vaccinated calves was not an issue for pregnant cows, the United States Department of Agriculture (USDA) required manufacturers to administer MLVs directly to pregnant cows during each trimester of gestation. In these trials it was recognized that cows needed to have been vaccinated with an MLV vaccine within the previous 12 months for that vaccine to be safely given during pregnancy.

Although most manufacturers have completed this testing and

have received the USDA label claim “safe for use in pregnant cows,” risk of reproductive loss when administering an MLV vaccine to a pregnant cow still exists. For this reason, it is important to follow the vaccine label instructions and discuss the use of MLVs in pregnant cows with your veterinarian prior to use.

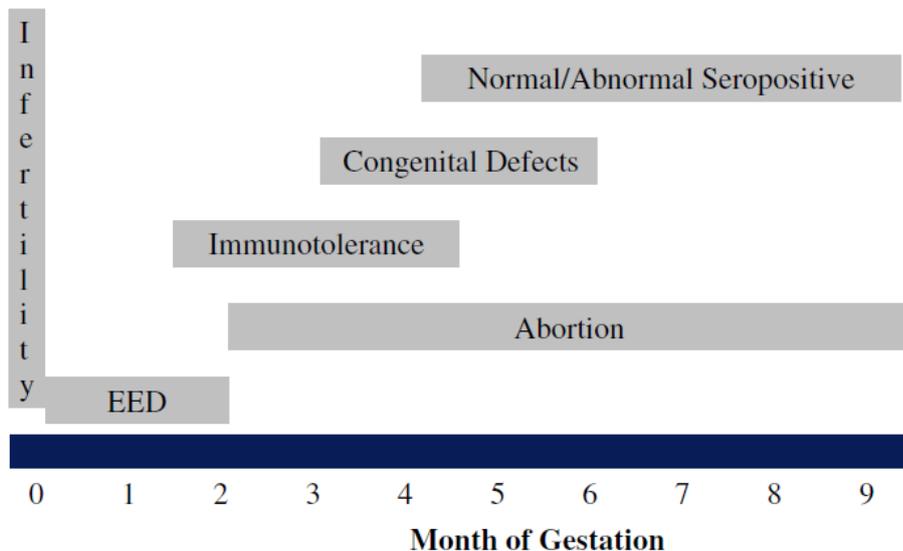
Recent studies^{3,4} have shown very slight reductions in conception rates in animals vaccinated prebreeding with an MLV compared to a KV or CV due to temporary adverse effects of vaccinal MLV IBR virus upon developing follicles in the ovaries. This effect is dependent upon both how many times an animal has been given MLV IBR vaccine in the past (the more doses of MLV IBR the animal has received, the less likely it is that there will be an effect on conception) and timing of the vaccination (the adverse effects become more likely the closer in time the vaccine is administered to breeding).

On the other hand, studies have demonstrated severe reproductive losses in animals vaccinated with KV or CV when challenged with BVD.⁵ Producers should consult with their veterinarian about whether the potential effects on conception outweigh the many benefits of MLV vaccines. Regardless of which type of vaccine is chosen to use in the mature cow herd, evidence supports administering at least one dose of MLV to weaned heifers to stimulate cell-mediated immune responses.

For reproductive protection, KVs are generally regarded as the

Figure 1: Potential clinical reproductive outcomes following BVD infection

EED = early embryonic death. Immunotolerance = formation of a persistently infected or PI animal.



Source: Grooms DL. Reproductive consequences of infection with bovine viral diarrhea virus. *Vet Clin Food Anim* 2004; 20: 5-19.

safest option because they can be given at any time during pregnancy. Drawbacks to KV usage include: slower onset of immunity due to the necessity of an initial two dose series, shorter duration of immunity requiring more frequent revaccination, reduced protection against the formation of a BVD PI,¹ greater likelihood of allergic reactions and post-vaccination lumps, uncertainty about the stimulation of cell-mediated immunity, and cost.

CVs contain a mix of modified-live and killed antigens. They are similar to KVs in that they are safe to administer at any time, but they also require a follow-up booster dose to achieve adequate protection.

Tailored program

Vaccination of the cow herd is an important matter that

deserves serious consideration. We must balance protection from reproductive losses with the safety of the vaccine. No single vaccination protocol will work for all producers. Protocols must be tailored to each individual operation and must consider management practices and disease pressure. Your local veterinarian is the best source of information to help you develop a vaccination protocol for your herd. **HW**

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¹Walz P, Chamorro M, et al. Bovine viral diarrhea virus: An updated American College of Veterinary Internal Medicine consensus statement with focus on virus biology, hosts, immunosuppression, and vaccination. *J Vet Intern Med* 2020; 1-17.

²Walz PH et al. Evaluation of reproductive protection against bovine viral diarrhea virus and bovine herpesvirus-1 afforded by annual revaccination with modified-live viral or combination modified-live/killed viral vaccines after primary vaccination with modified-live viral vaccine. *Vaccine* 2017; 35: 1046-1054.

³Perry GA. Safety of Vaccination with an Inactivated or Modified Live Viral Reproductive Vaccine When Compared to Sterile Saline in Beef Cows. *Jacobs J Vet Sci Res* 2016; 2(2): 35.

⁴Perry GA, et al. Influence of vaccination with a combined chemically altered/inactivated BHV-1/BVD vaccine or a modified-live BHV-1/BVD vaccine on reproductive performance in beef cows and heifers. *Bovine Practitioner* 2018; 52(1): 53-58.

⁵Walz PH, et al. Comparison of reproductive protection against bovine viral diarrhea virus provided by multivalent viral vaccines containing inactivated fractions of bovine viral diarrhea virus 1 and 2. *Vaccine* 2018; 36(26): 3853-3860.