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Modified-Live vs. Killed Vaccine Debate Continues

by **Troy Smith**

If you thought the debate was over, think again. Disagreement remains regarding whether an inactivated (killed) or modified-live virus vaccine should be used when immunizing pregnant cows and heifers. The discussion was rekindled recently after a vaccine manufacturer issued a press release citing instances where reproductive failures followed use of modified-live virus vaccine to immunize herds against infectious bovine rhinotracheitis (IBR). The release has appeared in an array of livestock publications.

“It has drawn a lot of attention, raised a lot of questions and generated a lot of discussion. But that’s good,” says David Smith, a veterinarian and professor at Mississippi State University College of Veterinary Medicine.

It’s good because more cow-calf producers are likely to become better

informed about differences in the types of vaccines and the importance of correctly following immunization protocols. However, Smith warns against “over-interpreting” the press release’s information.

The controversy over modified-live virus vaccines flared up last fall following publication of an article in the *Journal of the American Veterinary Medical Association*. The case report featured details of a 25% reproductive loss among University of Wyoming replacement heifers that had been appropriately vaccinated against IBR with a modified-live virus product. The article also noted that veterinary diagnostic labs in several states had reported increases in abortions in cows and heifers with a history of modified-live product use.

More recently, the aforementioned vaccine manufacturer’s press release

recounted the Wyoming case and reported others in South Dakota and Colorado where investigators concluded that reproductive failures were associated with modified-live virus use, even though vaccinations were administered according to label directions. Also noted was another scientific journal article that questioned the use of modified-live virus vaccines in pregnant cows and naïve heifers.

According to Smith, there’s really no doubt that modified-live vaccines sometimes cause trouble. Increased numbers of producers are using them in pregnant females, and some definitely have experienced reproductive problems. The potential is there because of virus replication occurring after vaccination. Replication is what stimulates a strong immune response. But, even though a vaccine virus doesn’t cause disease in the cow, the cells can damage the fetus and result in abortion. In previously unvaccinated cattle, the replicating virus may also inflame ovarian tissues, resulting in temporary infertility. In extremely rare instances, a vaccine might be contaminated with a “wild” virus which can directly cause disease.

Smith says none of those things can happen when a killed virus vaccine is used. However, he isn’t willing to say modified-live products should never be used in pregnant cows or heifers. Smith doesn’t dispute the findings of the reported outbreak investigations but says the body of evidence condemning modified-live products is limited. Much of it is anecdotal, while manufacturers have demonstrated in U.S. Department of Agriculture (USDA)-approved trials that their modified-live virus vaccines are safe for use in pregnant females.

“There is a lot of practical evidence that modified-live vaccines are relatively safe when used according to label directions,” states Smith. “Hundreds of thousands of doses have been used, without apparent adverse effects.”

Safe use of modified-live vaccines depends on a prior and sustained immune response. But no vaccine is 100% effective 100% of the time. Factors affecting immune response include nutritional status, stress and even genetics. It’s also possible for a disease challenge to be so great that it overwhelms an animal’s immune response. And creating a “sustained immune response means properly establishing initial immunity and maintaining it through annual boosters. A modified-live vaccine should not be administered to pregnant females if they did not receive the chosen product within the previous 12 months.

“When producers follow label directions carefully, they have fairly good assurance of safety,” Smith says. “If maintaining a regular schedule of immunization is too challenging, a killed vaccine may be a better choice. A killed vaccine offers greater safety, but a modified-live vaccine offers greater efficacy.”

When efficacy is a priority, Smith recommends that establishing and sustaining an immune response begins with replacement heifers receiving a modified-live virus vaccine at least

twice prior to breeding. Three times would be better. For example, a first vaccination could be administered at or before weaning, followed by another dose in three to four weeks. The third vaccination could be given about 30 days prior to breeding. Booster vaccinations would then be administered annually. The optimum time for annual revaccination would be prior to breeding. However, if it suits a producer, boosters could be administered in the fall — perhaps at the time of pregnancy testing.

According to veterinarian Dan Givens, however, research shows that giving a modified-live virus vaccine to totally naïve pregnant heifers can result in an abortion rate of up to 55%. Currently Givens, who is interim associate dean of academic affairs at Auburn University College of Veterinary Medicine, says there is a measure of risk when previously vaccinated pregnant females receive a modified-live vaccine, even when label directions are followed to the letter.

“The data shows that when you do everything right, giving a modified-live virus vaccine to pregnant cows may cause abortion in one out of 283 to 300 animals. If they aren’t effectively immunized, for any reason, the risk is higher,” states Givens.

If producers want greater assurance of safety, Givens would advise using a killed vaccine during pregnancy. But despite reports blaming modified-live vaccine for reproductive failures, Givens says many producers have used modified-live vaccines routinely and have seen no ill effects.

“Even before it was approved, a lot of producers used modified-live product in pregnant cows and had no problems,” he adds.

Still, reproductive problems are possible.

“If you know your operation is going to be challenged by disease, you have to determine what the level of risk is, and then decide if product efficacy or safety is most important,” Givens says, recommending producers consult their own veterinarians for assistance.

Contradictory evidence tends to prolong the debate on use of modified-live vaccines in pregnant females. Researchers, veterinarians and producers are divided.

“There is no simple answer,” Givens explains. “In essence, we are seeing the industry move toward equilibrium. But I anticipate a move toward recommendations involving use of a modified-live vaccine pre-breeding, followed by a killed vaccine during pregnancy.”

Meanwhile, Smith reminds producers that the fires of controversy are fanned by competition among vaccine manufacturers. Each company’s marketing efforts may involve promotion of evidence that sheds the most favorable light on its own wares.

“Drug companies are actively competing for a big market, so they are going to argue the relative merits of their products,” Smith adds. “We shouldn’t forget that vaccine marketing efforts are contributing to the discussion.” **HW**

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