Studies dispel common myths about inactivated vaccines

Viral immunology is not a good conversation starter for most of us. We gravitate to subjects like feed costs, weather patterns and sports to spark an engaging conversation. But these days, veterinary experts who specialize in studying immunology – and how vaccines work to fight off viral infections like BVD – are more excited than ever to talk about disease prevention.

“In the scientific community, our knowledge base on immunology is doubling every three to five years,” said Elliot Stevens, MS, DVM, Ph.D., a veterinary medicine research specialist with Rural Technologies in Brookings, S.D. “That’s really an incredible pace if you stop and think about it. We’re light years ahead of where we were as recently as the 1990s.”

What hasn’t kept pace with advances in viral immunology, however, is communication with producers to explain how modern vaccines work to prevent cattle diseases. Consequently, some long-held misconceptions about vaccines still linger. One of the most common beliefs held over from the 1990s is that inactivated, or killed, vaccines aren’t as effective as modified-live vaccines.

To provide the most effective immune response against viral diseases such as BVD, IBR and BRSV, a vaccine needs to produce two distinct types of immunity – humoral and cell-mediated. “The old belief was that inactivated vaccines did not provide as strong a cell-mediated immune response as modified-lives,” said Stevens. “That may have been true 25 years ago, but it’s woefully outdated and inaccurate today.”

Carlos Bonnot, DVM, owner of Wharton Veterinary Clinic on the Texas Gulf Coast, agrees. “I think the perception that modified-live vaccines provide a better immune response is still out there because that’s what we’ve been told for so long,” he said. “But studies support it’s obviously not true any longer.”

Stevens co-authored one of those studies, which recently appeared in the peer-reviewed journal, *Veterinary Therapeutics*. The study provides further evidence that properly adjuvanted inactivated vaccines provide a strong cell-mediated immune response, as well as a targeted humoral response, to give cattle long-lasting, reliable disease protection.

Results of the study challenge a long-held belief among many cattle industry professionals that was founded long before some of the current and most sophisticated inactivated vaccines were even on the market.

“What we found is consistent with other research that clearly shows oil-adjuvanted, inactivated vaccines provide a highly effective cell-mediated immune response,” said Stevens. “In fact, a previous study conducted at Iowa State University found that an inactivated vaccine provided a much stronger cell-mediated immune response to BRSV than the modified-live vaccine it was compared to. In that study, the inactivated vaccine had a tremendous advantage over the modified-live vaccine.”

Advances in viral immunology and how vaccines work to prevent common cattle diseases like BVD often start with human medicine.

Numerous studies have shown properly selected inactivated vaccines provide safer protection for pregnant cows.

Photo courtesy of Novartis Animal Health.
Over the last two decades, much of the research surrounding human vaccines has focused on inactivated, or non-infectious, products because they are recognized as being safer than modified-lives. New, improved technologies and adjuvants used in human inactivated vaccines are often quickly applied to animal vaccines.

**More, safer choices for producers**

As more producers have become aware the old dogma surrounding inactivated vaccines isn’t always correct, they have taken advantage of added safety benefits these products offer, particularly in pregnant animals. Abortions have become an increasing threat for pregnant cows and producers can reduce this risk by using inactivated vaccines in breeding animals.

Veterinary diagnosticians at several universities, including Colorado State, South Dakota State, Texas A&M and the University of Wyoming have reported seeing an increase in the number of abortions resulting from IBR and BVD in the last few years. Many of those cases have been linked to improper use of modified-live vaccines. The problem comes when the label instructions are not fully followed because IBR modified-live vaccines are abortifacient agents.

Additionally, pregnant cows have a weakened immune system, which makes them more vulnerable to diseases such as IBR. Modified-live vaccines are “immunosuppressive” – meaning they can weaken the immune system for a period of time immediately following administration.

The rapid increase in abortion rates is raising concern at veterinary diagnostic laboratories. In the Aug. 1, 2010, edition of *Journal of the American Veterinary Medical Association*, a letter to the editor from two diagnosticians representing major universities suggested that some modified-live vaccines designed for pregnant cattle should be withdrawn from the market.

**Avoiding the risk**

Producers invest a lot of time, energy and resources in their breeding programs to improve pregnancy rates and reproductive efficiency. By the time a cow or heifer has settled, producers have written a handful of checks to get each animal pregnant.

Supportive medicinal therapy such as prostaglandin, veterinary visits, pregnancy checking and nutritional supplements all add up to a pretty big expense report for breeding females. That’s why every effort possible should be made to maintain pregnancies, safeguarding both the calves and the investments they represent.

One way to do that is to choose an inactivated vaccine for vaccinating pregnant cows. A properly selected inactivated vaccine provides safe, effective protection against respiratory and reproductive disease – including IBR – in pregnant cows and heifers. It’s important for producers to consult with their herd veterinarian to review vaccine options in order to make selections best suited to the unique needs of their cattle.

For his part, Bonnot recommends using an inactivated vaccine for pregnant cattle. “We’ve been using an inactivated vaccine for at least five years now and have seen a significant increase in reproductive efficiency,” said Bonnot. “The improvement has been dramatic in some herds. It’s safe, cost-effective and provides immunity against the major bacterial and viral reproductive diseases in our area.”

References omitted due to space but are available upon request.

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Photo by Heather Smith Thomas.