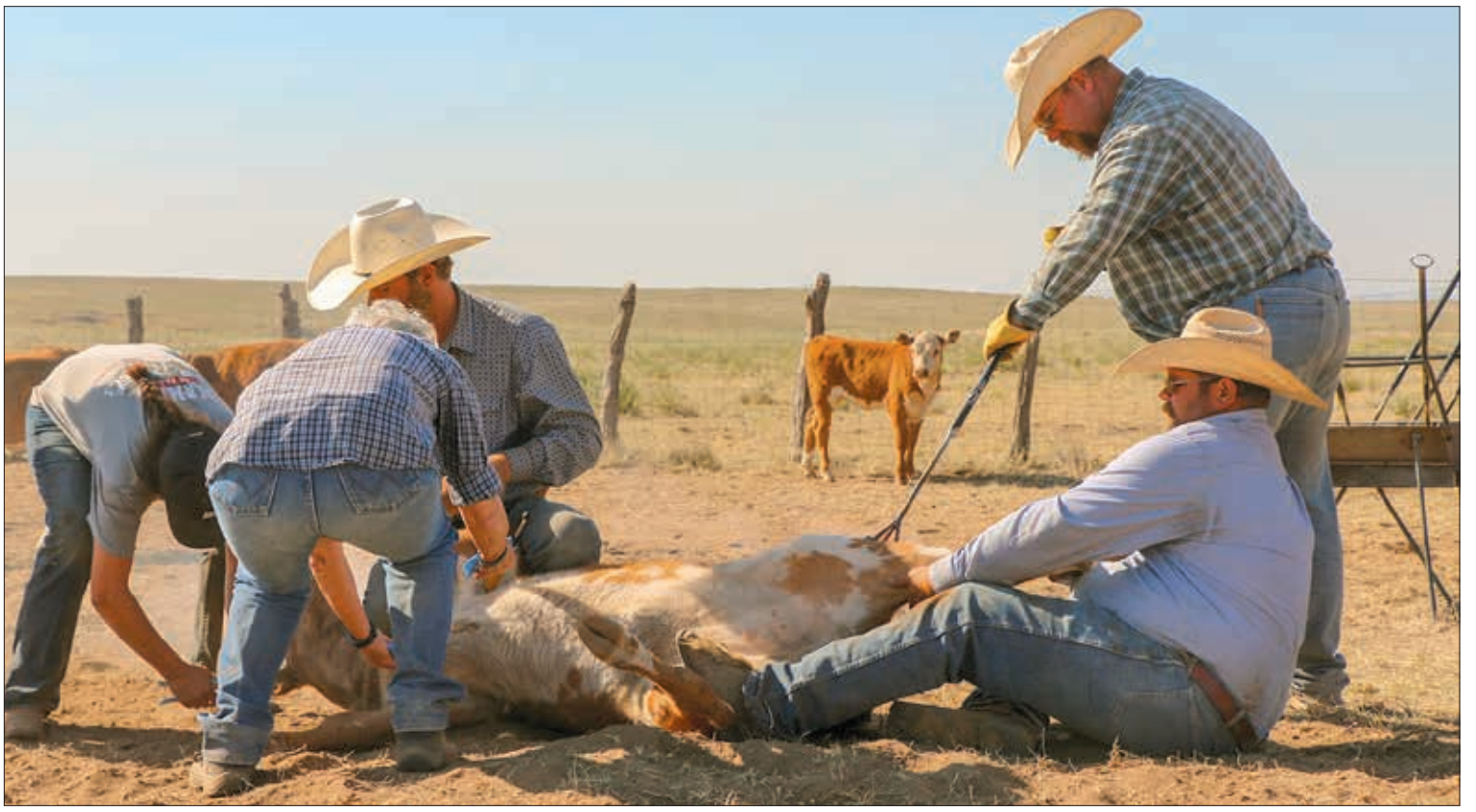

Developing a Pre-Weaning Vaccination Strategy

Boost herd health and increase yearling weights by protecting calves from harmful diseases.

by ***Heather Smith Thomas***

Cow-calf operations need to have a proper vaccine program to avoid serious and costly outbreaks. Research has shown preventing illnesses in young calves yields better growth rates and greater performance later in life. The best management strategies for maintaining herd health begin with early efforts at protecting cattle from diseases they may encounter throughout their lives.

It starts with the dam

Calves need to be protected from birth through weaning — this begins with building the immunity of the dam. Precalving vaccines are an effective way to protect calves from respiratory and clostridial diseases. Cows need to be vaccinated at the appropriate time during pregnancy to have high antibody levels included in the colostrum they produce.

PHOTO COURTESY OF VAN NEWKIRK HEREFORDS

Calves receive antibodies from colostrum, which build their immunity from day one.

This "first milk" contains maternal antibodies that kick-start a calf's immune system. Calves are prone to ingesting pathogens at birth from nursing a dirty udder or being born into a dirty environment. If a calf ingests an adequate amount of colostrum within a few hours of birth, it gains instant immunity from antibodies. However, vaccinating a calf at birth would not give its immune system time to mount a response from the vaccination, so calves depend on antibodies from colostrum to protect them immediately.

Still, some farmers or ranchers encounter problems like severe scours in newborns despite administering precalving vaccinations. In such cases producers must work with their veterinarian to figure out what they are dealing with and possibly give calves an oral product at birth. If scours in young calves is a regular problem, scour vaccines can be included in a cow's precalving vaccine protocol so that she can give the calf immediate protection.

Developing a timely program

Chris Chase, Ph.D., with the Department of Veterinary and Biomedical Sciences at South Dakota State University notes several considerations to keep in mind when setting up vaccination programs: Factors like the age of the calf, possible diseases it could be exposed to and the environment all play a key role in developing an effective plan. "The big thing is trying to match up a vaccination program with the issues you have had to deal with," Chase says.

Vaccinations are all about timing. Most calves get sick after weaning as they go into a backgrounding phase or feedlot. Timely vaccination to build immunity before calves are exposed and vulnerable to various pathogens can help, particularly in fighting

off pathogens that cause bovine respiratory disease (BRD).

Something to keep in mind is not to vaccinate too early. If maternal antibodies are still present in the calf, they tend to interfere with building self-immunity because the body sees no need to respond. When this temporary protection weakens after a few weeks or months, calves must build their own immunities.

"When maternal antibody protection begins to wane, we can probably get good response to calf vaccinations by about three months of age," Chase says. "It all depends on how much protection the calf received at birth. In most herds, you will not find 100 percent of calves fully protected — it is more like 70 to 80 percent."

Earlier vaccinations are becoming a norm in the industry to give calves an edge in the early stages of their lives. There are a lot of benefits from vaccinating calves while they are still on the cow. With their mothers, calves are not as stressed and can build better immunity.

"Giving calves vaccinations at two to three months of age has benefits. Many calves will develop some response, though not all of them will be protected against respiratory pathogens at weaning time," Chase says. Each calf may yield a different immunity depending on how it is able to respond to a vaccine.

Most Western ranchers give calfhood vaccinations at branding. "When vaccinating calves at this age, the goal is often just to prepare them for whatever they will encounter at weaning," Chase says. A set-up vaccination given at branding can then be boostered at weaning. If a producer wants to give a vaccination just prior to or at weaning, it is good to have this initial vaccination at an earlier age.

If there are issues with bovine respiratory syncytial virus (BRSV), though, a different plan is needed rather than vaccinating at branding time. If the calf received antibodies against BRSV from colostrum, it may not gain much immunity from injected vaccine (unless it is adjuvanted) until those maternal antibodies are gone from its system.

"BRSV is notorious for maternal interference that can last for a long time," Chase notes. "Producers need a specific plan for their own situation. There are many different protocols. You might decide to give calves vaccinations for IBR/BVD at branding time, but in reality those two diseases are generally not an issue in young calves."

Some producers cannot separate the cows and calves twice. In this situation, they should get the first dose of a vaccine into calves on the day of weaning and come back with a booster afterward. Whether this approach is successful, however, may depend on how stressful the weaning program is. It may work with a low-stress method like fenceline weaning but not as well with a method requiring abrupt separation from the cow. Anything a person can do to reduce stress will help calves to mount an immune response.

If producers do not give early vaccinations, most veterinarians recommend vaccinating calves two to four weeks prior to the estimated date of weaning, at which point calves can receive viral and clostridial vaccines.

Standard practices

David R. Smith, Ph.D., epidemiologist and beef program leader at Mississippi State University, points out many producers do not examine the reasons why they are giving vaccines, or when. "They have hands on their calves at branding, so this is usually when they vaccinate. That is not necessarily bad, but we need to think about the problems we are trying to solve," he says. "What we accomplish by using calfhood vaccines is to stimulate some immunity to protect calves at weaning time."

Although it is best to develop a vaccination program targeting a herd's specific needs, it is standard practice to vaccinate against clostridial diseases. Blackleg, malignant edema, redwater and gut infections caused by different types of *Clostridia perfringens* are all forms of clostridial diseases and pose deadly risks to calves at any age.

"Calfhood diseases we see in unvaccinated calves include blackleg and some of the other clostridial diseases like enterotoxemia, and the various pathogens that cause scours, along with respiratory diseases like pneumonia," Smith says. "Each rancher needs to tailor a vaccine program to protect against the diseases that affect calves on his or her ranch. The clostridial vaccines are very effective, and good insurance."

Respiratory diseases are also a common threat to calves. Summer pneumonia, a common respiratory illness, presents itself year-round, making it difficult to determine an optimal time for vaccination.

Clostridial diseases may vary in different regions

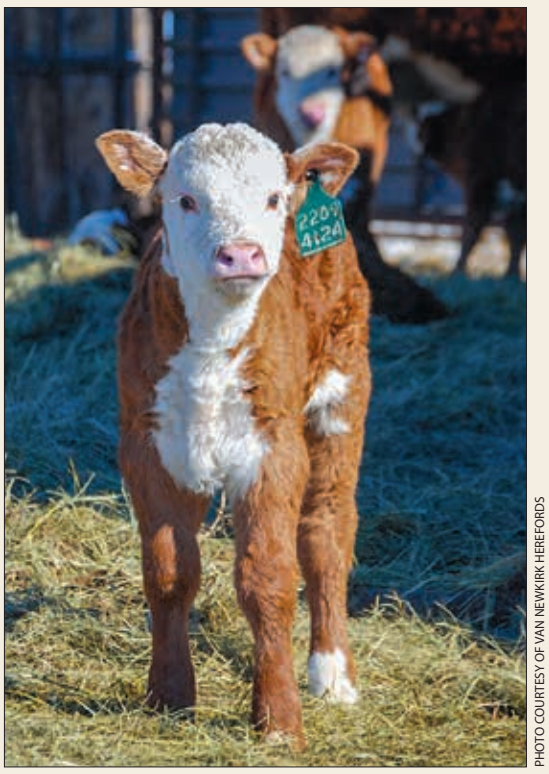

PHOTO COURTESY OF VAN NEWKIRK HEREFORDS

Tom Hairgrove, Ph.D., Extension veterinarian at Texas A&M University, stresses the importance of producers sitting down with their local veterinarian to build a health plan/vaccination program appropriate for their area. "Use a clostridial vaccine that is appropriate for your husbandry practices and your locality," he recommends.

Blackleg and redwater (Clostridia *haemolyticum*) are common pathogens requiring vaccination. Without adequate protection, some cases of blackleg are likely to arise. "This organism is always present in the environment, but seems to go in cycles depending on what sets things up for risk and actual disease. Blackleg is usually found in calves, but can occur at any age in animals that do not have adequate immunity," Hairgrove says.

He explains, "At about 90 days of age, we recommend that all calves receive a blackleg vaccine that includes other clostridials. In South Texas, the Gulf Coast states and several other regions, many ranchers also need to include redwater in the clostridial vaccine. This can vary from ranch to ranch, depending on risks, which include liver flukes—which are spread by certain snails."

Some people think they do not have snails or liver flukes because they live in an arid region. "I practiced for a while in dry West Texas and had one ranch client where we had a lot of problems with liver flukes," Hairgrove says. "His soil pH was alkaline and the ranch had some irrigated pasture with all the right conditions for flukes. The problem is more prevalent, however, as we get farther down along the Gulf Coast."

Tetanus is another disease to monitor. "In some areas, calves become infected with tetanus after routine castration, and if you use banding for castration, vaccination for tetanus is essential. In several regions it is wise to include haemolyticum, due to issues with liver fluke. Also make sure you booster that properly," he says.

Combination vaccines will cover most bases, but producers need to know what is in those specific combinations. An 8-way vaccine may include tetanus or haemolyticum, but not both. An 8-way vaccine can be confusing — producers should consult their veterinarian before administering anything to their calves. HW

"In our recent study of summer pneumonia, about one herd out of five has problems in calves on any given year," Smith says. "Half the battle is figuring out when you can get your hands on the calves or cows to give vaccines. The other half of the challenge is determining the most appropriate thing to be doing."

Vaccination is not the only component of a prevention strategy. Smith notes it is important to address management practices in preventing outbreaks. "Make sure pairs mother up and that calves get timely and adequate colostrum intake," he recommends. "Be cautious about introducing new cattle [and new pathogens] and also minimize opportunities for calves to share pathogens with each other."

No two ranches have the same situation. "Calving in sheds poses different risks for calfhood diseases than calving on dry hillsides or clean pastures. This is why you need to talk with your local veterinarian who knows your operation and understands your unique challenges and your own herd and management."

Managing clostridia and summer pneumonia

Clostridia is difficult to address with management because the environment is already contaminated with clostridia spores. Vaccination is imperative for protection.

Clostridial vaccines will always produce a good response in young calves. The 7- or 8-way clostridial vaccine can be given at any age. "The literature tells us that if there are maternal antibodies present these might not work, but field experience shows that those vaccines definitely have efficacy even if given at a young age. This is especially true if you are looking at *C. perfringens* in young calves, or blackleg," Smith says.

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With most bacterial vaccines, it does not do much good to give these to calves before three weeks of age, but clostridials are an exception. For instance, if a producer is having problems with enterotoxemia, calves can be vaccinated at a very young age, even if the cows were vaccinated during pregnancy. "This is because the toxoids are very effective vaccines," Chase explains.

"You can give these vaccines and usually not have to worry about problems with maternal antibody interference," he adds. "Part of the reason is that with Clostridia we are vaccinating against an exotoxin. This is a simpler antigen; it is easier for the immune system to see and attack, compared with some of the viruses and all the processes that must happen to protect against those."

> "...talk with your local veterinarian who knows your operation and understands your unique challenges and your own herd and management."
>
> **— Dr. David R. Smith**

Chase suggests using intranasal vaccines for viral diseases only if they are an issue and to vaccinate again at branding time or later with a booster. Timing is important, and vaccinating calves all at once at branding means some may be two months old and some may be two weeks old, so their response will be variable.

According to Chase, intranasal vaccines are a good option to combat summer pneumonia, especially when BRSV is the source of the outbreak. "If there is a summer pneumonia problem, BRSV is usually the culprit," he says. "The intranasal vaccine has the ability to get around the maternal antibodies."

There is not a specific vaccine for BRSV. Currently, only combination products containing BRSV, infectious bovine rhinotracheitis (IBR), bovine virus diarrhea (BVD) and parainfluenza$_3$ (PI$_3$) exist, even though at this age in calves the BRSV is the only thing to worry about.

The other thing a producer can do is to use an adjuvanted vaccine. An adjuvant is a substance added to the vaccine that enhances the body's immune response to an antigen. "People often think that only an inactivated vaccine is adjuvanted, but we do have some adjuvanted modified-live vaccines. We do not yet know, however, how effective these vaccines are against BRSV in calves with maternal antibodies," Chase notes.

Summer pneumonia could also be due to Mannheimia haemolytica or Pasteurella multocida. In this case Chase recommends producers use either a live or inactivated vaccine to protect against those bacteria.

"Some research indicates that even with inactivated vaccines there is some maternal interference, up to at least four to six weeks of age," he says. "The response is quite variable, so we have to consider the strategic issues. At what age are calves having problems? It often pays to wait until the calves are a little older, but if you are having a problem, you may need to address it quicker."

Always consult your vet

Vaccine programs are not one-size-fits-all. Thus, it is important that every individual work with a veterinarian to plan a strategic vaccination program that best fits his or her situation and management style. It is useful to evaluate herd history regarding diseases that previously affected cattle as well as the ages of cattle at the time those diseases were contracted. HW

Inactivated and intranasal vaccines

Determining the best type of vaccine to use can be tricky. Chris Chase, Ph.D., with the Department of Veterinary and Biomedical Sciences at South Dakota State University has some recommendations based on research conducted by him and his team.

Inactivated vaccines have demonstrated effectiveness within weeks. "Some of the work we have done with inactivated vaccines shows that even after one dose of vaccine, we can see that some of the T-cells are turned on within 2 weeks of vaccination" Chase says.

"For instance, we see bovine virus diarrhea (BVD) antibodies coming up, even after 14-21 days, which is exciting, because we generally do not see much response when we vaccinate with just one dose of inactivated vaccine (without following with a booster). To use just one dose would be off-label, however, because we do not have enough data to say you would be safe (developing immunity) with just a single dose."

In most production schemes, it may be hard to give the calves a second dose. In this instance, producers should stick with using vaccines in which a single dose provides adequate immunity.

"At this point in time the intranasal vaccine gives the most likelihood of success and the least likelihood of failure. From two weeks up to three months, this makes the most sense, particularly if you are worried about bovine respiratory syncytial virus (BRSV). Adjuvanted modified-live vaccines, where you give a single dose, also has some usefulness, but I have not seen enough data yet in young calves. The intranasal vaccine, by contrast, has plenty of data to show that it works," Chase says.

"The data clearly shows that the intranasal vaccine works well in the face of maternal antibodies when the researchers came back and challenged those calves 60 to 70 days later — as would be the case in calves that get summer pneumonia at one to two months of age."

If producers do not see summer pneumonia or rarely see BRSV in calves before weaning, there is no reason to use intranasal vaccines; calves can probably mount immunity adequately with injectable vaccines. HW