

PHOTO BY MICKY WILSON

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Effects of BRD Vaccines Studied

For those questioning the wisdom of vaccinating cattle for bovine respiratory disease, recent research provides some answers.

Story by
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Jason Sawyer, beef researcher with Texas A&M University's (TAMU's) Department of Animal Science, is well aware there is suspicion among some beef producers that vaccinating their cattle for bovine respiratory disease (BRD) before they enter the feedlot could cost them a whole lot more than the price of the shots.

"The premise behind our study was to try and address a concern that a lot of producers have expressed," he says. "The concern is that by using the modified-live vaccine (MLV) on calves at weaning time, it might impair their performance in the feedlot."

Sawyer adds that producers have told him they have observed excessive sweating in the animal soon after the vaccinations, which has led them to

believe there could be a period of time following treatment when their calves were not performing to their potential. As a result, those producers concluded the financial implications of vaccinating their calves could extend to reduced weight gain and diminished carcass quality.

"When producers brought the issue to us and we started considering the scientific merit of the question, we began looking for studies that dealt with the issue," he says. "We couldn't find anything that described the presence or absence of that sort of negative effect."

For beef researchers like Sawyer, the issue isn't minor. He says that while the majority of producers vaccinate for BRD, many do not.

"If you look at the data out there, from sources like Superior Livestock, a reasonable estimate of those who vaccinate is 60% to 70%," he says. "That means between 30% and 40%

do not take advantage of the vaccines available."

Overlooking real effects

While there might have been a question before Sawyer's study as to whether vaccinating calves for respiratory diseases might have had a direct effect on feedlot performance, there was absolutely no question about the effect respiratory diseases have had on vulnerable animals confined in a feedlot.

A bulletin published by the University of Minnesota's Beef Team refers to BRD as one of the biggest thieves of profits in the beef industry, accounting for approximately 75% of all illnesses in feedlot cattle and 50% of the deaths. The bulletin refers to a 1996 feedlot study in which 38% of

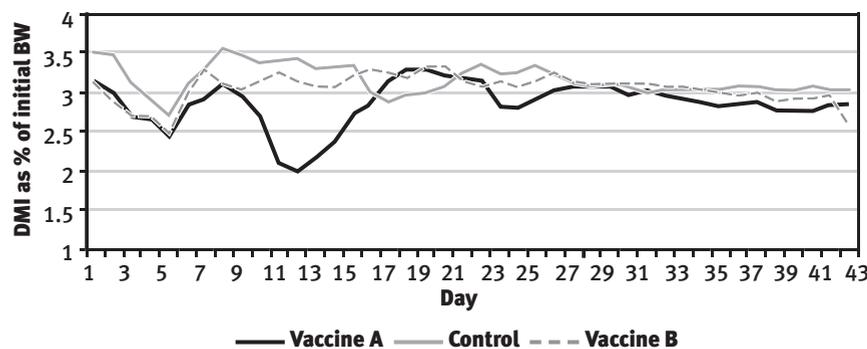
calves, representing a cross section of young animals, had to be pulled and treated for BRD.

At harvest it was further observed that another 68% of the remaining untreated animals in the study were identified as having lung lesions consistent with pneumonia. It was concluded that those animals were also affected by BRD in the feedlot but had missed visual detection.

Financial repercussions

In what is now viewed by many beef researchers as a definitive study conducted by Oklahoma State University (OSU) in 2000, researchers evaluated the economic effect of respiratory disease on 204 steer calves during their 150-day finishing period.

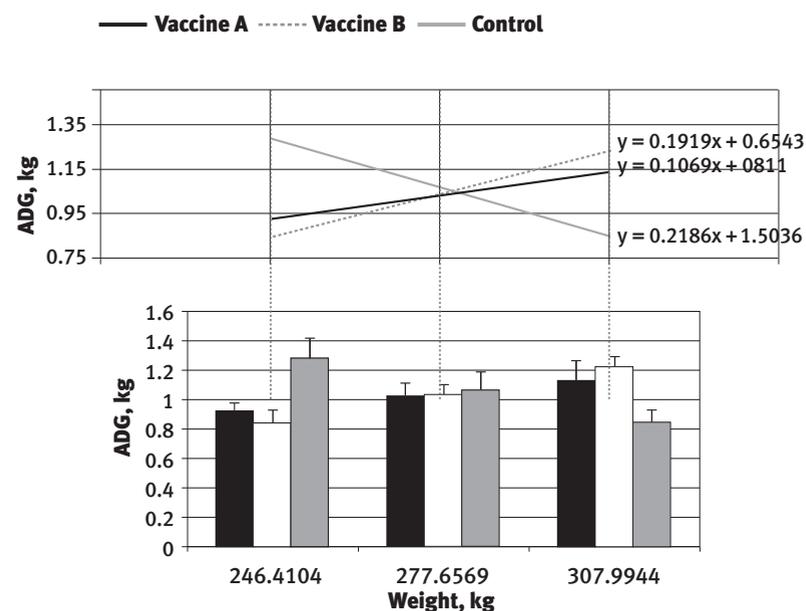
Fig. 1: Dry-matter intake expressed as % of initial body weight



Time (day) effect, $P > 0.01$.
Treatment effect, $P > 0.01$.
Treatment \times time effect, $P > 0.01$, steer treated with Vaccine A had lower intake than steers from other treatment groups from days 10 through 17.

Source: Texas A&M University.

Fig. 2: Total average daily gain (ADG)



While in the feedlot, calves included in the study were monitored on a daily basis for signs of respiratory distress and other indications of lung infection, such as listlessness, lack of fill, coughing, and nasal and ocular discharge.

Rectal temperatures were taken on those displaying these symptoms, and those with a temperature of more than 40° C were treated with antibiotics using a predetermined protocol developed by the consulting veterinarian and maintained at the hospital pen for a minimum of three days.

During the study, four steers died — two of respiratory disorders and two of metabolic disorders. Two chronically morbid steers were marketed early, and one animal was held for residue clearance at the conclusion of the finishing period.

The health of each animal was determined by the clinical records collected during the 150-day finishing period and an inspection of lungs for lesions and lymph nodes for activity at time of harvest. Animals with lung lesions and swollen lymph nodes were classified as having an active respiratory disorder, while ones that showed no abnormalities of the lymph nodes but had lesions on their lungs were believed to have had a previous case of BRD.

Criteria for pricing was based on an average of feeder steer prices during a 10-year period from 1985 to 1995, and carcass premium and discount averages were based on data from 1995 and 1996. The feed cost was fixed at \$165 per ton on a dry-matter (DM) basis.

For the OSU researchers, the results couldn't have been clearer. There was a definite cost associated with the occurrence of respiratory disease in feedlot steers. Animals with lung lesions but nonactive lymph nodes received \$20.03 less than steers without lung lesions. While 25% of the difference was for medicine costs, the other 75% was due to decreased carcass value (9.4% more U.S. Standard carcasses and 3.9% less carcass weight).

Steers with lesions and active lymph nodes fared even worse. The difference between those animals and animals with no lesions totaled \$73.78, with 21% of that difference representing medical expenses and 79% due to lower carcass weight (8.4% less) and lower quality grade (24.7% more U.S. Standard carcasses).

Vaccine effects evaluated

Once Sawyer and his colleagues at TAMU were satisfied that no previous attempt had been made to scientifically evaluate the effect of respiratory vaccines on steer performance in the feedlot, it was decided they would proceed with a study.

"We used modified-live vaccines from two different companies," says graduate assistant and fellow researcher Willy Horne, adding that this was important because the goal of their study was not to evaluate the performance of specific vaccines but to determine if and how steer calves physically responded to receiving a live respiratory vaccine. "These products

represented the most recent technology in vaccine production."

In an effort to specifically evaluate the effect of a vaccine in the feedlot without risking the introduction of an already infected steer into the study group, all 107 of the animals involved were confirmed not to be persistently infected (PI) with bovine viral diarrhea (BVD) and confirmed seronegative to BVD and infectious

bovine rhinotracheitis (IBR) prior to acceptance into the study. PI-negative confirmation was made through testing an ear notch sample by antigen capture ELISA. Seronegativity to BVD and IBR was determined using serum neutralization tests on blood samples drawn from each animal.

Calves in the study received one of three vaccine treatments. Two

were the commercially used MLV vaccines mentioned earlier. The third, a physiological saline, functioned as the control.

The study used Calan gates to measure daily feed intake (see Fig.1). Rectal temperature and body weight were recorded on days 0, 1, 3, 7, 14 and 28 following treatment applications. Blood

(Continued on page 46)

Effects of BRD Vaccines Studied *(from page 45)*

samples were also drawn on those days and sent to the laboratory for quantification of serum neutralizing antibody titers to BVD Type 1, BVD Type 2 and IBR.

On Day 0 and Day 49, all steers were ultrasounded for fat thickness over the 12th rib, ribeye area (REA) and percentage intramuscular fat (%IMF).

Response dependent on weight

While there were no long-term correlations drawn between vaccinations and feed intake, the research team identified a link between effect of the vaccines, daily weight gain and the size of the calves.

“What we saw was an interaction

between the vaccine treatments and how heavy the animal was at the beginning of the trial,” Horne says. “The lightest of the animals going into the study, when vaccinated, had a reduced average daily gain (ADG) over the 42-day study period.”

The research team determined, at the beginning of the study, that the average steer weighed 560 pounds (lb.).

“We looked at animals that were one

standard deviation lighter than average — 500 pounds or less — as being in the light category,” Horne says. “Those animals’ performances were negatively affected by the vaccine over the length of the study.”

The daily gains of vaccinated animals in the average weight category — between 500 lb. and 620 lb. — were the same as their control counterparts, while vaccinated animals that were heavier than the average — 620 lb. or greater — showed a better ADG than the nonvaccinated animals in the control group (see Fig. 2, page 44).

“We are not aware that anyone else has ever described this particular effect,” Horne says. “To the best of our knowledge this is new information.” He warns that in light of this fact, any conclusions drawn from the study’s observations would be strictly speculative at this point and not a product of scientific analysis.

With that said, he adds, there could be more than one factor at work. An obvious possibility is that the smaller animals are more sensitive to stressors and less able to recover. In a similar vein, he notes that there may also be a relationship between weight variability in the immunized calves and the practice of administering a standardized vaccine dosage to all animals.

“All animals receive exactly the same dose regardless if they are a newborn calf or a 1,200-pound cow,” Horne says. “What that means is that the lighter animals are receiving more virus particles for their body weight, which, in turn, could cause them to have a greater inflammatory response to the vaccine than the larger animals.”

Sawyer admits it is more of a problem to hypothesize why the largest vaccinated animals had a better daily gain than their control group. “It is difficult to come up with a good explanation for that occurring unless the explanation is that some of those animals in the study were exposed to the virus itself,” he says. “In that case, those animals that didn’t receive vaccine would have performed worse than those that did.”

If that was the case, he adds, those infections would have remained subclinical, because no infections were identified during the course of the study.

Sawyer admits that the study has generated more questions than definitive answers.

“We need more data so that is why we have continued our work in this area,” he says. “We would hope, within the next year, to have a clearer picture of what is occurring here.”

While Sawyer suggests that producers might want to consult with their veterinarian about body weight considerations when vaccinating, he is adamant that the study’s results should in no way be construed as a recommendation not to vaccinate. “It is our opinion that any reduction in weight gain due to vaccination is outweighed, tenfold, by not vaccinating and having an outbreak of one of these viruses.”