

A BVD Wreck: A Practitioner's Approach to Epidemiology

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Summary

In December of 1982 a client of ours purchased 254 head of 530 pound steer calves at a local auction market, "processed" the cattle according to our recommendations and placed the cattle in their own feedlot. Within 6 days the cattle started getting sick. Despite individual and herd treatment, calves started dying—12 head within the next 4 days. A diagnosis of Bovine Virus Diarrhea (BVD) with secondary bronchopneumonia was made.

Before the smoke had cleared, 82 head were dead, many survivors were textbook case chronics, and the veterinarians and owners were left scratching their heads wondering what went wrong.

This paper describes "the wreck," the experiences and prejudices of the veterinarians prior to this event, their effort to establish the pathogenesis and epidemiology involved, and finally—what effect this wreck had on their recommendations for disease prevention in a feedlot practice.

The Wreck

The 7-10 month old steer calves purchased by the client weighed 530 pounds and were taken away from their mothers the day of the sale, hauled less than 100 miles to the auction and sold. The following morning the calves were vaccinated using Norden's modified live virus IBR-PI-3, Beecham's *Clostridium chauvei*, septicum, and Beecham's *Hemophilus somnus* bacterins; implanted with compudose, and branded. Following the work, the cattle were hauled the 40 miles to the feedlot and mingled with 61 head of similarly sized steers that had been purchased and processed identically earlier that month.

Within 6 days the new cattle went "off feed" and showed signs of respiratory disease. Individuals were treated. A snow storm and weather change that hit the area, though not severe, was a contributing factor. Postmortem examinations revealed severe bronchial pneumonia. Further diagnostic work prompted a preliminary diagnosis of BVD. Four days later 12 were dead, and upwards of 75 others were serious to critical. Over 50 head were treated individually and herd treatment with sulfas was initiated. BVD confirmation by the state's veterinary diagnostic laboratory was by FA, virus isolation, by histopath and by serum antibody titers.

By January 1st 35 head had died. Treatment was continued as needed, though all concerned were frustrated by

the lack of response to treatment. Many of the malingerers eventually succumbed—82 in total. The survivors were affected. The cattle were of quality such that they were expected to slaughter by June 15 (180 days on feed), but the final cattle were not sold until August 15. The size of the loss is difficult to assess, considering feed efficiency, extra days on feed, labor, etc. The cost of death and the cost of treatment is measurable, (though the value of treatment is not—it appears as though the treatment was futile). The loss can be substantiated at over \$40,000.

Pre-Wreck Philosophy on BVD Immunization

War Story #1: In 1976 a client called for assistance. His replacement heifers, weaned the previous fall, were affected with an "incurable" disease. He had treated about 10% of his 200 calves since weaning, but had lost almost all of them. He went so far as to say—he thought he was going to lose every one he had treated.

I was certain that I could improve on that so he brought me his chronics and a couple of fresh ones, and a dead one. Post-mortem exam appeared like a BVD-mucosal disease. While awaiting results from the laboratory I proceeded to treat the sick ones. The owner was right—they died. The laboratory report confirmed our diagnosis of BVD.

What to do? Vaccinate, right? We vaccinated, and turned a slowly progressively headache into an acute disastrous pain in the other end. It was all over in about 2 weeks, but we lost another 10%.

Our conclusion (confirmed by the vaccine's producer): Don't vaccinate for BVD in the face of a BVD outbreak.

War Story #2: In 1980 a feedlot owner consulted with us as to what vaccine he should use in his 1000 head feedlot (actually he had a list of vaccines and was asking that we "bid" on his project). We submitted our product costs, but declined to "bid" on BVD vaccine as we thought it unnecessary, and possibly even dangerous on calves.

We lost the bid, but won some satisfaction as his calves went through a transitory period of inappetance, diarrhea, salivation, soft cough that started about 5 days post processing. The condition was mild and transitory—except in one pen. The owner had lost 5 head, and eventually lost all 10 head that came from 1 herd and was part of a "put-together" load at a local salebarn. We assumed these calves

to be immune incompetent either by virtue of genetics or gestational exposure.

Our conclusion: Don't vaccinate the weaning calf for BVD on arrival at the feedlot.

Consequently, we don't use much BVD vaccine. And I don't think we are missing much. A 1984 survey indicated what we had always believed—that most cattle are already exposed to BVD. 780 pregnant heifers and cows, from 39 western Nebraska ranches were bled and BVD titers established. 100% of the herds had at least 1 of 20 head show some titer. 89% of the cows had a measurable titer. 82% had a titer equal to or greater than 1:128.

Granted, by not vaccinating, our feedlot operators may be suffering from reduced efficiency due to subclinical BVD—but our practice philosophy is: “say what you want about the cost of inapparent infection, the truth is, you never have to call the rendering truck for victims of a subclinical disease.”

Back to the Wreck

The reaction by the owner and subsequently by our veterinarians, was similar to what psychologists describe for human patients who discover they are terminally ill. Initial denial (“this can't be happening to me”), followed by shock and despair (“numb and speechless”), followed by anger (*#S@?*), and finally quiet resolve (“I'm going to fight this thing to the end”).

I must say that it was neither the client's nor our intention to go seeking a scapegoat. In the early stages we just wanted help, eventually, we just wanted answers.

One of our clinic's veterinarians, Dr. Richard Jagers, was taking a year's sabbatical from our practice and attending graduate school at the University of Nebraska. This looked like an ideal project, and an ideal time to try to determine “Who Done It?” The laboratory findings and much of the information that follows is a direct result of his diligent efforts.

We started by making a list of potential sources of the BVD virus.

1. Natural exposure
2. BVD virus vaccine
3. BVD viral contaminant in other vaccines
4. Congenital immune incompetence
5. Acquired immune incompetence—stress or steroids
6. J.O.O.T.T. (just one of those things)

We resolved to search until a plausible answer surfaced, not realizing at what lengths we might have to search. You might call it the “Quincy syndrome”—the delusion that there is no diagnostic challenge that cannot be solved before the end of the hour. What follows is a list of evidence that we wished to acquire. Realize that some of these searches were going on concurrently, some sequentially as early leads met with dead ends.

Information Search List

1. Review vaccination program for any chance of use of

BVD vaccine.

2. Consult sale barn veterinarian for objective evaluation of cattle at time of sale.

3. Contact biological supplier for “help and information.”

4. Evaluate health status of other cattle in the feedlot, including those cattle in the same pen from different source.

5. Identify destination of cattle sold from same herd, same day, to other cattle feeders to determine if they had a similar health problems.

6. Review health status of cattle from ranch of origin. Obtain information as to what, if any vaccination procedures were used.

7. Contact veterinarian for ranch of origin.

8. Begin check of vaccine serials used in these cattle for possibility of viral contaminant.

9. Do serology testing on cattle from ranch of origin—mothers, heifer mates to affected steers. Do serology on cattle at destination feedlot—penmates, sick cattle, pregnant heifers in same lot.

Evidence and Observations

1. There was no possibility that the cattle were given BVD vaccine after purchase. The work was done by the feedlot owners, the vaccine was obtained from our clinic.

2. The sale barn veterinarian concurred with the feedlot owner that the cattle were thin but of good health at the time of sale. The sale barn owner told us that the cattle had been consigned for 2 weeks previous to the date of sale, but muddy roads to the ranch prevented their earlier delivery. One might speculate that the delay in sale might instead have been caused by the calves having been sick, but there is no real evidence that such was the case.

3. The biological company that produced the MLV IBR vaccine was uncooperative. The spokesman said that to send out a field representative might imply some responsibility on their part. He also said that if litigation was on our minds that we ought to contact their staff attorney.

4. Only a few of the penmates to the cattle in question ever experienced illness sufficiently severe to require treatment. While one of those penmates died, it was one that had been sick prior to the arrival of the South Dakota steers. Pregnant heifers across the fence, and heavier cattle in the same feedlot were never affected with any clinical signs of disease resembling the BVD outbreak.

5. A lighter cut of cattle, steers from the same herd of origin (160 head) was sold to a cattle feeder from Valentine, Nebraska. He did not process his cattle on arrival, but reported an inordinant number of sick steers. He estimated 20% had been treated for pneumonia, 2 had died, several appeared to be “chronic lungers”. No diagnostic follow-up was done on this herd.

6. The ranch of origin had retained ownership of the heifer mates to these steers. They had been vaccinated for brucellosis 3 months before sale and weaning. On the same dates they, and the steers later sold, were vaccinated with “four-way

blackleg,” and Norden’s IBR vaccine. They reported no serious health problems prior to weaning—but since weaning they had 20% morbidity and 1% dead or chronic of the 400+ heifers retained. The mothers of the calves in question had been vaccinated with Grand Laboratory’s *E. coli* vaccine 3 weeks prior to calving. They experienced no side effects subsequent to vaccination—no severe diarrhea problems, no monster calves, and no dummy-type calves.

7. Attempts to culture a “wild” BVD virus from same serial IBR vaccine were negative. Isolation was attempted from vaccine obtained from our clinic and unused vaccine from the ranch of origin. Two laboratories were used to attempt the isolation. It is interesting that the USDA laboratory called the tests negative after two days, while the University of Nebraska lab concluded the test negative only after eight weeks.

8. Veterinarian for the herd of origin concurred with the owners as to the vaccines used and the timing of their use.

9. The diagnosis of Bovine Virus Diarrhea was made by FA and virus isolation from the feedlot deaths. The ranch of origin donated a chronic to the diagnostic efforts—BVD virus was isolated from it.

Serum antibodies from 8 of the sick and dying cattle ranged from 1:2 to 1:128. A second paired sample was not obtained since all 8 calves died. Two unaffected penmates had titers of 1:2 and 1:4. Pregnant heifers owned by the feedlot and pastured across the fence were part of the previously mentioned survey. Only one of twenty tested showed any titer to BVD.

Single blood samples were obtained from cattle at the South Dakota herd of origin. 5 calves had titers from 1:2 to 1:64. Fifteen pregnant cows had titers from 1:64 to 1:1024.

Conclusions: Who Did It?

1. Natural exposure? Unlikely since there was no lateral transmission of the disease in the destination feedlot. BVD isolated from herd of origin would indicate that exposure occurred there.

2. BVD virus vaccine? The pathogenesis of the disease in the affected cattle was so like our previous experiences and so like textbook cases of vaccine induced outbreaks that this at first seemed the most likely—and yet was the most easily disproved, both in the destination feedlot and the ranch of origin.

3. BVD virus contaminant? Another likely contender in the early going. The manufacturer’s arrogant and evasive attitude would indicate that it was a possibility. Isolation attempts are time consuming, never a quick answer, and even an eventual negative is not a certainty. That is, you cannot prove a negative—it cannot be proved there is NO contaminant, it can only be certain proof if there IS a contaminant isolated. Since the virus was found in the herd of origin, any vaccine contaminant would likely have been in vaccine used by the original owners. This vaccine too, was found negative in tests for wild virus.

4. Acquired immune incompetence? Some cattlemen, even some veterinarians, use corticosteroids in an indiscriminant manner which would allow such a mortality. Such is not the case at this feedlot, and there is no indication of such use by original owners. As for stress, these cattle would appear to have been stressed far less than most. In my own prejudiced opinion, “stress” is a big excuse-box that we veterinarians throw things into that we cannot explain in identifiable terms. Nearly as good a case can be made for having vaccinated “under the wrong sign.” These cattle were stressed less than the average feedlot animal—on feedlot ration within 36 hours of being taken from the cow. The calves were in good shape and apparently healthy at the time of purchase. The cattle were given modified live virus vaccine but such is a common practice—in these cattle it was actually a booster dose since they were “preconditioned” at the ranch of origin.

5. Congenital immune incompetence? The titers in the dead and dying calves was surprising as some scientists have found that immune incompetent, viral shedding cattle may show no antibody response whatsoever. The extremely high antibody titers of the mother cows 10 months after these calves were born is a real curiosity—considering the owners statement that the cows were neither vaccinated nor sick.

6. J.O.O.T.T.? Our efforts to find a fail-safe diagnosis were unsuccessful. Our final conclusion is that the cattle left South Dakota carrying BVD virus and an immune deficiency. Cause of that deficiency is unknown. The disease seemed to be limited to the South Dakota ranch cattle—no lateral transmission. If the cattle were viral shedders, the virulence was diminished.

Epilogue

That’s the end of the wreck, and the end of the search for truth and honor, but not the end of speculation.

All of this is prefaced on the assumption that everyone was telling us the truth. What if someone lied, or told us less than he knew

Similarly, everyone concerned (with the exception of the representative of the biological laboratory supplying the vaccine) was most cooperative, and still we were unable to pinpoint a cause. If this had been a case with litigation involved it is doubtful we would have obtained the same cooperation. So what if you found yourself as the defendant in such a wreck

Finally, the scary part of all of this is that it appears that it could happen again. The REALLY SCARY part is that it could even happen to some poor cattle feeding veterinarian. .

Post Wreck Philosophy

We felt we couldn’t go through an experience like this without reassessing our feedlot vaccination program. Our current recommendations for the viral vaccines:

1. No modified live BVD vaccine for any purpose.

Reasoning: why vaccinate for a disease so widespread that upwards of 100% of the cowherds have measurable titers—especially if the vaccine has the potential for producing disease.

2. No BVD vaccine, even killed for feedlot calves.

Reasoning: if an animal is immune incompetent what reason is there to believe it will build immunity to even a killed vaccine. If the only animals you protect are capable of fighting off the infection anyway—why vaccinate.

3. No modified live virus other than intranasal IBR-PI3 to any incoming feedlot calf, unless it has already been weaned.

Reasoning: killed IBR vaccine or intranasal vaccines “might” lessen the chances of disease in an immune incompetent BVD virus shedding animal. The biggest advantage may be that the animals quick response to intranasal vaccination may assist in protection from secondary infection in the case of pre-existing BVD.

References

1. Bovine Medicine and Surgery; Gibbons, Catcott, Smithcors; 1st edition, 1970.
2. Current Veterinary Therapy—Food Animal Practice; Saunders, 1981.
3. “A BVD Calftood Vaccination Trial in a Persistently Infected Herd: Effects on Titers, Health and Growth”; Ernst and Butler; Can. J. Comp. Med.; 1983.
4. “A Monograph on BVD Vaccine”; Searl, et. al; Ft. Dodge lab.; 1981.
5. “Reproductive Performance of Apparently Healthy Cattle Persistently Infected with BVD Virus”; McClurkin, et. al.; J.A.V.M.A. 174:10.
6. “Factors Influencing Morbidity and Mortality in Feedlot Calves in Ontario”; Martin, S.W.; Veterinary Clinics of North America: Large Animal Practice; vol. 5:1.
7. Brown, L.N.; pathologist; Veterinary Diagnostic Services; personal communications.
8. McClurkin, A.W.; veterinary medicine officer; USDA; personal communications.
9. McClurkin & Jagers; unpublished report: Survey of Western Nebraska Beef Cows for Blue Tongue and BVD titers; 1984.
10. Nelson, Elliott; USDA Biologics Specialist; personal communications.
11. University of Nebraska Diagnostic Laboratory Pathologists; UNL, Lincoln, Nebraska, personal communications.