Current Observations On The Bovine Respiratory Disease Complex In High Plains Feedyards

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Current Observations on BRD

The bovine respiratory disease (BRD) complex *is* more complex than an elephant. Just as the blind men gave diverse descriptions of the elephant, comments concerning BRD will certainly vary according to the bias of the observer. The following biased report comes from a laboratory diagnostician, and is an overview of BRD episodes as they have occurred in the custom cattle feeding industry of the High Plains during recent years.

Etiology (bacterial)

Pasteurella hemolytica Type I is the most commonly isolated bacterial pathogen from the acutely affected bovine lung. Compared to 90% or greater frequency of isolation for *Pasteurella hemolytica, Hemophilus somnus* has been isolated from approximately 5% of submissions.

Later in the course of BRD, the other opportunistic pathogens such as *Pasteurella multocida, Corynebacterium pyogenes* and/or *Fusobacterium necrophorus* will more likely be present.

Pasteurella hemolytica upper respiratory infection frequently exists without overt clinical respiratory disease. To satisfactorily explain the common isolation of this pathogen from the pneumonic bovine lung, one need not attempt to explain why *Pasteurella hemolytica* infection occurred. One needs instead, to explain what interfered with the normal defenses of this calf or reduced the immunity of this calf to pre-existing infection. This answer must be sought in the typical fibrinopurulent pneumonia or shipping fever case.

Conversely, a calf may over-react to a *Pasteurella hemolytica* antigenic stimulus. Rather than immune suppression, we may be seeing the results of a hypersensitivity state. This adverse response to administration of *Pasteurella hemolytica* bacterins may occasionally be observed. The "pre-conditioned" calf may break with an atypical interstitial pneumonia in the feedlot. The practitioner may be at a serious disadvantage, and may need assistance from the pathologist and the immunologist to explain this rather unexpected and potentially embarrassing situation. The concurrent use of *Pasteurella spp.* bacterins and immune-modifier drugs such as injectible levamisole are now coming under scrutiny in this respect. A potentially adverse hypersensitivity response may be enhanced by this combination.

At the present research efforts and field case investigations aimed at better characterization of the natural defense mechanisms of the calf and the immune response of the calf to *Pasteurella hemolytica* infection constitute an exciting area of scientific investigation. These promise to be the most highly fruitful approaches to improved understanding of the BRD complex.

Etiology (viral)

Infectious bovine rhinotracheitis (IBR) virus appears to be of lessening significance as a primary viral pathogen in BRD. This is probably the result of the standard practice of relatively effective IBR vaccination of both breeding animals and feeder calves. When the IBR virus is isolated, the laboratory diagnostician must consider that it might well be only the recovery of a vaccine strain. IBR tends to be over-diagnosed.

Bovine virus diarrhea (BVD) virus is the one infectious agent most frequently isolated from BRD outbreaks characterized by unusually high morbidity and mortality. Approximately two-thirds (2/3) of all cattle reaching the feedyard have had prior exposure to BVD virus infection, as demonstrated by detectable serum neutralizing antibody titers. They are potential immune carriers and shedders of BVD virus. The remaining one-third (1/3) are susceptible. These calves constitute a high-risk category, as they will invariably be exposed in transit, at auctions, or soon upon arrival.

The BVD virus is mis-named. Neither diarrhea nor mucosal disease is the most frequent clinical sign resulting from BVD viral infection. Clinical shipping fever, non-responsive to antibiotic medication, is the condition the bovine practitioner should learn to recognize and associate with BVD infection. Because of its adverse effect on normal function of pulmonary macrophages and T-series lymphocytes, BVD virus infection is highly immunosuppressive. The "BVD" virus should more appropriately be called the "BRD" virus which would

remind us of its significance in the BRD complex, and be an acronym for "Bovine Resistance Decreasing", or for "Bovine Respiratory Debilitating" virus.

Parainfluenza-3 (PI3) virus must be mentioned in passing. This is a virus ubiquitous among ruminant populations. It is difficult to find seronegative bovine fetuses or calves. Low, transitory rises in antibody titers are to be expected with shipment (even in the healthy calf). Despite its common, former association with the BRD complex, and its inclusion in many commercially available vaccine combinations, PI3 can well be totally disregarded as a significant primary bovine pathogen. It is seldom found as a cause of generalized infection; its presence is not characterized by overt lesions; and where illness occurs and lesions are found, they are attributable to other, more virulent microorganisms. PI3 is an orphan virus; a very common cause of infection; seldom a cause of clinically apparent respiratory disease. Actual PI3 infection causes only transitory immunity. The inclusion of PI3 virus in bovine vaccines is of questionable value or merit, other than for sales promotion.

Due to the complexity of BRD, other viral agents, as well as the *Mycoplasma spp.* may yet emerge as causes of clinically distinct and economically significant syndromes. To date, in the High Plains area, BVD virus remains the front-runner as the inciting viral pathogen of significance.

Management Considerations

Despite frequent occurrence of infection by potential respiratory pathogens, disease does not always occur. When clinical BRD does occur, it varies in severity from episode to episode. Obviously management factors influence this relative severity. The bovine practitioner cannot prevent the infections, yet can substantially assist his client in reducing economic loss associated with BRD by appropriate management recommendations.

In the High Plains area, over the last five year period, several management problems have been rather consistently associated with BRD episodes of major proportion. The most frequent are briefly mentioned here.

Cattle:

The cattle themselves are most often blamed when a "wreck" occurs. Certainly light-weight calves, stale calves, long-haul calves, or those already doctored unsuccessfully at their last stopover, present somewhat of a risk. However, single origin, short-haul, fresh, direct from the ranch to the feedyard cattle may be a poor risk as well. They may have been highly sheltered from, and highly susceptible to, many common pathogens. Problems are not always the fault of the cattle. Consider these other factors as well.

People:

The height of the shipping fever season coincides with peak cattle movements, naturally. Too many calves, too few experienced people, delays in processing, crowded hospitals, overworked horses are worse factors than inclement weather. It has been said that the best BRD control measure known would be a good gate that could control the rate of arrivals at a feedyard. Close it as necessary.

Facilities and Planning:

One of the first signs of a sick calf is a calf that is not eating. If calves are on pasture, or are on a self-feeder, this early clinical sign is missed. Plan to feed and observe calves at feeding time during periods of peak susceptibility to BRD. Treatment response is noticeably poorer with each day's delay after onset of infection.

Plan a treatment facility that will allow at least a three-day course of therapy once it is begun. A calf that must be roped is not treated as soon, or as often as necessary.

Plan a receiving area for new arrivals and unprocessed calves that is segregated from pens on feed, from hospital pens or convalescent pens. Continual mixing of new cattle with either healthy cattle or sick cattle is adding fuel to the fire. It'll take a bigger water hose to put it out. A problem pen is easier to handle than a problem feedyard. Isolation pays.

Vaccinations:

Don't delay vaccination. The vaccine virus must beat the field strain to the scene, or you may just as well not use it. Add-on pens are trouble if cattle are added in odd lots and the whole pen awaits processing until all are assembled.

Vaccination may further stress new arrivals, but it's mild in comparison to what they've already been through. Get it over with, and get them on feed. One calf lost at day 3 is cheaper than one calf and 30 days' feed. BVD vaccine causes little stress at day 30, but it does little good. The susceptible calf has already recovered from natural infection or he's no longer around to be vaccinated.

Be super-cautious about the handling of modified-live viral vaccines. You can abuse them almost any old way until they are reconstituted, but then watch out. Use them fast. Keep them cool. Avoid sunlight. Reconstitute only what will be used immediately. Throw the remainder away. IBR breaks have a seasonal peak in the late summer and early fall in calves processed in hot weather. Processing crews can sneak by with sloppy procedures in the cool weather season.

Treatment Response:

Treat them early. Establish good blood levels. Follow up with second and third day treatments. Then you have used the right drugs, by the right route, at the right time. They should work. If more than 10% to 15% require therapy, run the pen and treat them all, and mass medicate as necessary.

When treatments do not work, it's time to reconsider your diagnosis pronto, even before you consider switching to

expensive, exotic or perhaps illegal drugs. Pulmonary adenomatosis emphysema complex due to pasture conditions, green chop, or other type of roughage fed, must be considered early. Atypical interstitial pneumonia due to hypersensitivity reactions must be considered. Are lungs more edematous, heavy and wet than they are pneumonic? You can't tell until you look, and histopathology might be necessary to confirm the type of pneumonia you are observing. Don't forget that lung lesions may occur with *Salmonella typhimurium* septicemia. Watch out for high nitrate levels in forage.

As previously discussed, underlying BVD-virus infection is a very significant and common cause of poor treatment response. The BVD-infected calf may have 75% of the lung affected very early in the course of *Pasteurella hemolytica* or *Hemophilus somnus* pneumonia. How did they get so sick, so fast? The immuno-suppressed calf does not respond quickly or respond well to antibiotics.

Just as the cattle are quickly blamed for most BRD problems, drug resistance is quickly used as an excuse when treatments fail. The diagnosis and the dosage, and BVD are often more important factors than the drug as causes of poor response.

Using minimum inhibitory concentration (MIC) sensitivity assays on *Pasteurella hemolytica* isolates from High Plains area feedyards, resistance patterns are found to be no different in wrecks than they are in ordinary run-of-the-mill BRD episodes. Streptomycin resistance is frequent. Penicillin and sulfamethazine may be a poor choice 50% of the time. Significant resistance to other drugs such as the tetracyclines, erythromycin, and neomycin are rarely detected.

Conclusion:

Control of BRD problems in the High Plains area boils down to concern with cattle susceptibility patterns and control of cattle movement. We need early-as-possible vaccination and early-as-possible treatment. We need enough good people to do the right thing with not-too-many cattle at the right time. Good management procedures are essential. If research efforts solve the problems of BVD and *Pasteurella hemolytica* infections, there will be a substantial reduction in economic loss due to the BRD complex in our large feedyards.