

Unmasking Bovine Coronavirus

Both management and vaccination can reduce health effects.

by Michael W. Bolton, DVM, MS

Here are a couple of scenarios that might be familiar, unfortunately. There's a group of baby calves with diarrhea that are sick for a couple of days but then recover without further incident.

You move a group of calves from the pasture into a shed or barn. They break with respiratory signs such as coughing, nasal discharge and a slight fever, but recover almost spontaneously.

The etiology (causative agent) in both these examples could be the same and may have stemmed from bovine coronavirus (BCoV or BCV). Many times, if attacking alone, BCoV is undiagnosed because it seldom results in extreme illness. However, if these calves progress to severe pneumonia or non-responsive diarrhea, and you have swabs or fecal samples submitted to the lab, BCoV is often present, along with a host of other pathogens such as mycoplasma bovis or rotavirus.

Just the facts

- Approximately 90% of cattle worldwide are exposed to BCoV at some point during their lifetime.
- The same BCoV can cause bovine respiratory disease (BRD), neonatal diarrhea (calf scours), or winter dysentery in adult cattle.

- BCoV does not stimulate the quick immunity (interferon) that is the body's first defense against most other viruses.
- Specifically, though not exclusively, BCoV targets goblet cells, which line both the trachea and the gut. These are the cells that produce a "mucus mat," which is the calf's defense against invasion by bad bacteria. When these bacteria are present at the same time, they have an unobstructed path to destroy lungs (e.g., Mycoplasma) or the gut lining (e.g., rotavirus or Escherichia coli [E. coli]).
- Unlike COVID-19, BCoV causes pathology primarily in the upper respiratory tract. It causes little direct pathology in the lungs. However, as stated above, the combination of upper respiratory tract damage, damage to goblet cells in the lungs and other pathology does often lead to secondary bacterial pneumonia.

Since BCoV is a single-stranded RNA virus, it can mutate (change) often and quickly, similar to SARS CoV-2, which causes COVID-19. Even though it can mutate often like changing tires at a NASCAR race for different track conditions, the engine (conserved part of virus) remains the same, which is why the same vaccines continue to be effective.

Some viruses like the polio virus have no protective coating or "envelope," but some viruses like BCoV do. Importantly, for enveloped viruses, the envelope is necessary for the virus to enter cells. However, detergents,

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disinfectants and sunlight generally degrade the envelope and thereby kill enveloped viruses. That is why there are hand sanitizers at the entrance of all grocery stores — they are effective. BCoV is sensitive to degradation by detergents, disinfectants and sunlight.

Decreasing BCoV-related illness

Understanding the preceding background helps to determine, logically, some actions that may lower the incidence of BCoV-caused illness in your calves.

1. If at all possible — calve outside — get out of the barn or calving shed.
2. Clean and disinfect all equipment (bottles, esophageal feeders, boots and coveralls) because BCoV can live on surfaces for a long time if not exposed to soap or disinfectants.
3. Do not commingle calves from other farms or your own calves from different locations. Although often unavoidable, one group may be shedding BCoV, which will affect the other group(s), likely when other stressors are occurring.
4. Keep stress of transportation and changes in environment to a minimum.
5. If doing the above is not possible, then vaccinate early. There are vaccines capable of preventing the effects of BCoV.

Vaccines proving effective

BCoV is pneumo-enteric, which is a fancy way of saying it can affect the gut as well as the upper respiratory tract. Presently, available vaccines are licensed only for the enteric (gut) form.

However, there is plenty of evidence suggesting a couple of these vaccines (described below) also protect against the respiratory form.

Some vaccines protect the calf via colostrum by vaccinating the dam prior to calving. These vaccines (e.g. Scourgard 4KC® from Zoetis and Guardian® from Merck) are effective against the gut form and also

protect against rotavirus and E. coli, etc.

Recently, much research focuses on vaccinating calves for the respiratory form, as BCoV is a major contributor to the bovine respiratory disease (BRD) complex, also known as shipping fever. BRD is the leading cause of sickness and death of beef cattle

(6 to 10 months old) entering feedlots. Calf Guard® from Zoetis — made from a 1972 strain of coronavirus (Mebus) from Nebraska — has been shown to lower respiratory illness in calves if given prior to entering the feedyard. Recently, Merck launched Bovilis BCV®, an intranasal vaccine made from a 2012 strain of the virus. It has demonstrated efficacy against both forms of disease, although the USDA labeled it for only the enteric form.

As you read this, hopefully without a mask fogging up your glasses, you understand a little more about BCoV and some practical steps you can take to lessen the negative impact it can have on the health of your herd. **HW**

Editor's note: Michael W. Bolton, DVM, MS is an independent consultant with Spring Hill Farm Consulting in Michigan.

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