Acute and five clinical forms (acute-immunosuppression) are observed, including non-cytopathic (NCP) and cytopathic (CP). Furthermore, within each species there are various subgenotypes including 12 in BVDV1 and two within BVDV2.

Three new species of BVDV have been identified including HoBi, pronghorn, and Bungowannah. Only HoBi has been associated with clinical signs (reproductive and PI) in cattle from South America and Southeast Asia. HoBi is proposed to be renamed BVDV3.

Within each species two distinct biotypes are observed, including non-cytopathic (NCP) and cytopathic (CP). Furthermore, two states of infection (persistent and acute) and five clinical forms (acute, severe, acute, hemorrhagic, acute-respiratory tract, and acute-immunosuppression) are also described. Finally, persistent infection (PI) with a noncytopathic BVDV followed by acute infection with a similar cytopathic BVDV strain results in mucosal disease.

The practical importance of genotypes and subgenotypes is several fold. First, it is uncertain if cross protection occurs across subgenotypes. Second, it is unclear whether diagnostic tests have comparable sensitivities across subgenotypes. Finally, the predominant genotype isolate in the U.S. is BVDV1b, however, many commercial vaccines and diagnostic tests are based on BVDV1a and BVDV2a.

Acute or transient BVDV infection can result in enteric, respiratory, or reproductive tract diseases of variable severity. Clinical variation from subclinical to fatal is believed to be dependant on viral strain, immune status of the host, reproductive status of the host, and secondary pathogens.

While the majority of acute BVDV infections is not clinically significant, infection of pregnant cattle can result in abortion, stillbirth, birth defects, or persistent infection (dam infected less than 125 days of gestation). Persistently infected (PI) calves may be born weak and fail to thrive, or may appear healthy. No matter their clinical appearance, PI calves can potentially shed large amounts of virus, and current control efforts in the U.S. are focused on the detection and removal of these animals.

The hemorrhagic syndrome due to thrombocytopenia is clinically characterized by bloody diarrhea, nosebleed, external or internal hemorrhages, and bleeding from injection sights. It is primarily associated with infection with NCP BVDV2. BVDV also occurs in a variety of domestic and wild ruminants including New World Cameldids and several species of deer.

Testing strategies

Several testing strategies are available for BVDV, each having distinct advantages and disadvantages. The type of test chosen also depends on what samples are easiest to obtain. The following is a list of testing strategies with selected comments.

Viral Isolation (VI): Formalin fix tissues. Used to identify PIs. Not always available.

Viral culture: Viral growth in cell culture. Used in unvaccinated herds to determine BVDV free status.

Capture ELISA (Ag cELISA): PCR on pooled whole blood + IHC of PCR positives.

Ag Capture ELISA (Ag cELISA): (serum, ear notch) Fast. Less expensive. Good sensitivity/specificity. Takes place of IHC.

Combination: Example – PCR on pooled whole blood + IHC of PCR positives.

Economic Impact

Several approaches have been proposed to determine the cost of BVDV infection in cattle populations. Most of the published data are in regard to estimates in dairy cattle, with little information available concerning cow-calf, feedlot, and stocker operations. As well, a large proportion of estimates are based on data collected from countries other than the U.S. Enumerating production costs is difficult due to the large number of variables in many analyses. A brief list of cost factors might include reduced milk production, high somatic cell counts, reduced conception rates, immunosuppression, increased susceptibility and severity of disease, treatment costs, animal mortality, feed efficiency, etc. A model that does not include every possible variable will likely underestimate the true cost of BVDV. Lastly, variation in virulence of different BVDV strains clearly exists. Some published reports have provided cost estimates in herds with mild clinical signs, versus others having more severe clinical signs due to infection with highly virulent strains.

All said, the complexity of determining the economic impact of BVDV should not prevent practitioners from consulting with producers to determine the best means of addressing BVDV. In general, the economic impacts can be categorized into production (continued on next page)
BVDV... (continued from previous page)

...losses, costs associated with treatments and testing, and costs associated with implementing biosecurity efforts. Producers can be given a general outline regarding the potential effects of BVDV based on their type of operation.

Dairy: Detrimental effects in dairy cattle include reduced milk production, reduced fertility, poor growth of replacement heifers, increased secondary disease, early culling, and increased mortality. Ongoing BVDV infections has also been shown to increase the risk of clinical mastitis, retained placenta, and increased calving intervals. Several studies have indicated specific monetary losses, however these were clearly dependant on the particular operation, situation and event.

Cow/calf: BVDV has been associated with reduced fertility, abortion and poor growth rates. In addition, the purported immunosuppressive effects of BVDV result in increased secondary diseases. Studies have shown that calves born during BVDV outbreaks suffered increased mortality. Others have demonstrated increased incidence of respiratory viruses and bacteria found in calves previously exposed to BVDV.

Feedlot: Studies have demonstrated an increased risk for respiratory tract diseases in cattle exposed to PI in either the same calves previously exposed to BVDV have demonstrated increased incidence of breaks suffered increased mortality. Others shown that calves born during BVDV out increased secondary diseases. Studies have growth rates. In addition, the purported im- gains after feeding.

February 25, 2011

...predominance indicating most field isolates suggest there has been a shift in relative currently the prevalent subgenotypes.

...different subgenotypes. In the U.S. will have comparable sensitivities between strains. In 2007, a BVDV variant was identified as a control point in US BVDV infection is limited regarding transmission between TI cervids and cattle. The significance of this information lies in consideration of management strategies of cattle exposed to wild cervids and cattle. The significance of this information lies in consideration of management strategies of cattle exposed to wild cervids and cattle. The significance of this information lies in consideration of management strategies of cattle exposed to wild cervids and cattle. The significance of this information lies in consideration of management strategies of cattle exposed to wild cervids and...