Bovine Viral Diarrhea (BVD)

A PowerPage Presented By

Bovine Viral Diarrhea is responsible for economic losses in cattle worldwide. Loss of productivity, reproductive wastage, and increased morbidity and mortality have been attributed to BVD virus. It is a Pestivirus in the family Flaviviridae and is thus an RNA virus which is closely related to classical swine fever virus and border disease virus of sheep. It can re-assort and change antigenically; this may aid the virus in escaping immune mechanisms and thus remaining active. Due to its large economic impact, having an understanding of the pathophysiology, clinical signs, and prevention is important.

Virus Classification

- The virus can be classified into type 1 and type 2 infections based on genotype
  - Both types can exist as either cytopathic (CP) or noncytopathic (NCP) biotype
  - Biotype does not indicate virulence, but only how the isolate behaves in tissue culture

Clinical Forms

Subclinical:

- Many animals which have never been observed to be ill have antibody present

Acute BVD

- Most common in cattle **6 to 24 months of age**
- After 5 to 7 days incubation, causes fever, leukopenia, anorexia, oculonasal discharge, oral erosions and ulcers, and diarrhea
- Virus damages the epithelium of the mouth, esophagus, intestine and bronchi
- Immunosuppression and pneumonia from bacterial pathogens can occur

Hemorrhagic Syndrome:

- BVD virus-induced thrombocytopenia

Reproductive loss:

- **Infertility** and early **embryonic death**
- Abortion can occur at any period but is most common when the fetus is infected **at 50 to 100 days gestation**
- Congenital defects are most common when infection occurs **at 100 to 150 days gestation**, and include hydrocephalus, cerebellar hypoplasia, hypomyelinogenesis, ocular defects, hypotrichosis, and brachygnathia.
- Persistent fetal infection occurs **at 40 to 125 days** if the fetus is exposed to a NCP biotype
  - In this form, the fetus is immunotolerant and if it survives, the animal acts as a reservoir and consistently sheds virus
  - These carriers are **persistently infected** and called **PI** animals. They are the **main way that BVD is maintained** in a herd

Mucosal disease or chronic BVD:

- Occurs when a persistently infected animal is **superinfected** with a CP biotype of BVDV or the NCP biotype switches to the CP biotype
- **Mucosal disease is a peracute often fatal attack of BVD**
- Chronic BVD is eventually fatal

Diagnosis

- **Based on antigen detection**
  - Fluorescent antibody, immunohistochemistry, or antigen capture ELISA can be utilized
  - Ear notches are often used for immunhistochemistry detection of carriers
- PCR or serology can also be used
- Differentials for clinical forms of BVD include:
- MCF
  - Typically has greater lymph node enlargement and bilateral corneal opacity, whereas corneal opacity probably occurs in only 1 % of BVD cases
- Rinderpest
- FMD
- Vesicular stomatitis, and bovine popular stomatitis
  - Usually are associated with oral lesions but are not associated with diarrhea

Treatment

- Treatment of acute BVD cases is generally **aimed at preventing serious secondary infections** such as Mannheimia hemolytica pneumonia and at providing fluids and electrolytes

Prevention and Control

- Biosecurity, vaccination, and **detection and elimination of carriers (PI animals)** are the principle means of preventing and controlling BVDV
- **Vaccination** aimed at protecting young animals as maternal immunity wanes
- Vaccination of cows is aimed at preventing PI calves and reproductive losses via fetal infection
- Killed virus vaccines require two doses, whereas modified live virus vaccines only require one dose
- Replacement heifers are vaccinated with modified live virus vaccine at 5 to 6 months of age
- Cows are vaccinated prior to breeding season using modified live virus vaccine containing both type 1 and type 2 viruses
- Pregnant cows can be safely vaccinated with killed vaccine; however fetal protection appears to be better when modified live virus vaccines are used