Effect of time and serum IgG levels on the diagnosis of persistent infection (PI) with BVDV in neonatal calves.

Background

Bovine viral diarrhea virus (BVDV) infection continues to cause major economic losses to cattle producers in the United States (US) due to pregnancy loss and increased morbidity resulting from viral infection.[1-3] Identification and elimination of calves persistently infected (PI) with BVDV shortly after birth to prevent exposure to pregnant cattle is of outmost importance in BVDV control and eradication programs across the globe.[4-6] Antigen detection tests such as antigen-capture ELISA (ACE), reverse transcription polymerase chain reaction (RT-PCR), immunohistochemistry (IHC), and chute-side ELISA snap tests (i.e., IDEXX Snap BVDV antigen text®, IDEXX, Fort Collins, CO) are commonly used by producers and veterinarians for the identification of PI cattle. Although the majority of BVDV PI antigen tests are highly sensitive and consistent identifying PI cattle, when testing neonatal calves, the presence of colostrum-derived BVDV antibodies interferes with the performance of some blood-based BVDV antigen tests.[7-9]

Materials and Methods

Ten Black Angus, 18-month-old, pregnant heifers were inoculated intranasally with BVDV 1b strain AU526 between 70 and 90 days of gestation. After calving, serum, whole blood [white blood cells (WBC)], nasal swabs (NS), and skin (ear notch) samples were collected from newborn calves before colostrum intake (T0), as well as 12h (T1), 24h (T2), 7days (T3), 14d (T4), and 28d (T5) after birth. At each time point, ear notch samples were tested for BVDV PI by antigen capture ELISA (ACE), RT-PCR, and the calf-side IDEXX Snap BVDV antigen text®. Serum and WBC samples were tested for PI with ACE, RT-PCR, and virus isolation (VI). Additionally, serum IgG and neutralizing BVDV antibody titers were evaluated at each time point) by single radial immunodiffusion (SRID) and virus neutralization (VN), respectively.

Preliminary results and impact

Between 12 and 24 hours of life, the false negative rate of the IDEXX Snap BVDV antigen text®, ACE, VI and PCR in serum samples from this population of neonatal BVDV PI calves varied from 10 to 100% depending on diagnostic test and testing time. Between 12 and 24 hours of life, the false negative rate of the IDEXX Snap BVDV antigen text® in skin (ear notches) varied from 30% to 40% depending on testing time. The mean serum levels of total IgG increased in all calves until 24 hours. There was a moderate but significant negative correlation between serum IgG and serum ACE results as the greater serum IgG levels the greater the chance for a false negative serum ACE BVDV PI result. These preliminary results demonstrate a significant interference of colostrum-derived immunity and BVDV PI diagnostic test performance.

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