Transmission of Bovine Viral Diarrhea Virus from Acutely Infected White-tailed Deer to Cattle via Indirect Contact

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Introduction

Bovine viral diarrhea viruses (BVDV) are found worldwide, and acute infections in cattle result in enteric, respiratory, and reproductive diseases of varying severity, depending on the BVDV strain, the immune and reproductive status of the host and the presence of secondary pathogens. While most commonly associated with cattle, there is evidence, based on serology and virus isolation, that BVDV replicates in a wide range of cervids. Because free-ranging cervid populations are frequently in contact with domestic cattle in the United States, possible transfer of BVDV between cattle and cervids has significant implication for proposed BVDV control programs. Previous research has demonstrated transmission of BVDV from persistently infected (PI) deer to cattle and from PI cattle to deer via direct contact [1, 2]. While direct contact between wild cervids and cattle is observed in the field, indirect contact via cervid contamination of feed bunks, salt blocks and pasture is probably more common. Further, although PI animals are a major vector in the introduction of BVDV into naïve herds, circulation of the virus within a population is due, at least in part, to transmission of virus from acutely infected animals. In this study the transmission of BVDV to cattle from acutely infected deer via indirect contact is examined.

Materials and Methods

White tailed deer fawns were collected at birth and bottle fed goat colostrum for the first two days of life after which they were switched to goat milk. Fawns were group housed in indoor climate controlled pens under BL2 containment. After testing free of BVDV and anti-BVDV antibodies, they were inoculated with a BVDV2 strain that had been originally isolated from a free ranging white tailed deer. Colostrum deprived calves were tested free of BVDV and anti-BVDV antibodies and group housed in pens, under BL2 containment, that shared circulating air with inoculated fawn pens. Calves were bottle fed with the same bottles used to feed deer. Every second day, fawns were transferred to a clean pen and calves were transferred to the pen that the fawns had occupied. The rooms that the fawns had occupied were not washed down before the calves were transferred. Blood samples were collected for circulating white blood cell counts, virus isolation and virus neutralization at days 2, 3, 6, 9, 11, 13, and 20 post fawn inoculation.

Results

Virus was first isolated from fawns on either days three and six post inoculation and neutralizing antibodies were detected by day 13. Transmission to some, but not all calves, was detected based on virus isolation on day nine and virus neutralization on day 20.

Significance

While PI cervids have been harvested from the field and generated experimentally there is a question whether limited survival and low prevalence of PI's in the wild offsets the impact of BVDV infection in cervids on BVDV control programs in domestic animals. These results demonstrate the transmission of BVDV from acutely infected deer to cattle via shared feeding equipment and housing. This points to the possibility that acutely infected wild deer could transfer BVDV to domestic cattle herds and between cattle herds via contamination of feed bunks and salt licks and sharing of pasture.

References

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