

# Outcome of a bovine viral diarrhea virus infection in a South Dakota herd including reproductive losses, persistent infection, and mortality data from PI animals

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## Introduction

Infection of pregnant dams with bovine viral diarrhea virus (BVDV) during the first trimester of gestation can result in the establishment of a persistent infection in the fetus and BVDV is then constitutively shed by the persistently infected (PI) calf. PI cattle have been identified as a major reservoir for the virus. BVDV control and eradication efforts focus on the detection and removal of PI animals from herds. This study describes the epidemiological, clinical, and pathological features of an isolated outbreak of BVDV infection in a South Dakota cattle herd in 2003.

## Materials and Methods

In 2003, 136 bred heifers were purchased from a cattle operation in Butte County, SD and housed at the Antelope Livestock Range Research Station at Buffalo, SD. The following spring (2004 calving season) 128 calves were born, nine of which had congenital lesions consistent with BVDV infection. Several additional calves died within the first few weeks after birth, which prompted investigation and BVDV diagnostic testing. Calves PI with BVDV were identified by ear notch immunohistochemistry (IHC). Subsequent serologic evaluation of cattle for antibody titers against BVDV and assessment of herd records and necropsy reports were used to generate a detailed description of this BVDV outbreak. The 5' UTR and E2 regions of the BVDV isolated from PI calves were sequenced for genotype identification. Herd data were used for descriptive statistical analyses.

## Results

Forty-four calves tested positive for BVDV by ear notch immunohistochemistry. The PI calves were not born in a cluster, but instead represented a modest percentage of the births throughout the entire 2004

calving season. The PI viral sequences identified two distinct viral strains (both type 2a) that simultaneously spread through the original bred herd. Even though two BVDV strains were identified, it was not possible to discern which virus emerged first. At birth, PI calves weighed significantly less than did their BVDV-negative cohorts, and this weight difference was still significant at 14 weeks of age, with PI calves weighing a mean of 67 lb (30 kg) less than BVDV-negative calves. During the stressful period of weaning, five of 44 PI calves died. Three of the remaining 39 calves were deemed transiently infected and developed strong immunological titers against BVDV. Several of the PI calves also developed low serological titers against BVDV type 1 and BVDV type 2. At approximately 368 days of age, the PI calves began to die suddenly, and there was no apparent correlation with death and serum BVDV antibody titer or birth order. In total, 23 PI calves died, two were euthanized, and 11 were sold for immediate slaughter. Of the 23 calves that died, 17 had lesions consistent with mucosal disease during necropsy.

## Significance

This case study is notable because of the considerable magnitude of this single outbreak and the spectrum of losses associated with the complex pathology of BVDV infection. Follow up surveillance measures confirmed that all PI animals had been removed and subsequent BVDV tests of the cow herd were negative. Proactive biosecurity and prompt intervention are essential for BVDV control programs in the United States. Substantial economic losses can result from an unforeseen outbreak of BVDV, and until PI fetuses can be safely and consistently identified during gestation, the risk of introducing BVDV into a herd via the purchase of bred cattle remains considerable.