Calf age does not affect test sensitivity or specificity for detection of BVD virus in New Zealand

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Introduction

Bovine virus diarrhea virus (BVDV) is a common viral infection which results in immunosuppression, gastrointestinal disease, and impaired fertility. Where cattle are less than 150 d pregnant and are exposed to the virus, the fetus may become persistently infected (PI) resulting in lifetime shedding of the virus. Control strategies include testing and removing PI calves based on testing ear-notch tissue samples to minimize the risk of false negative results associated with persistence of maternal antibodies.

This study aimed to define the prevalence at herd and calf level amongst 6-week-old calves from herds that had evidence of BVDV in the lactation preceding the calves' birth. The objective of this study was to assess test sensitivity when calves are tested at <35 days of age.

Materials and Methods

Calves (n=1,030) from New Zealand spring-calving, pasture-based dairy herds in which BVDV had been detected in bulk-tank milk (n=8 herds) or following individual animal testing (n=3 herds) were enrolled. All female calves kept as replacements in the subsequent year had an ear tissue sample collected at approximately 38 (±3.5) d postpartum at weekly visits to each herd. Calves were ear notched at 3, 10, 24, and 38 (+/- 3) d postpartum. An average of 94 (SD = 44, range = 35-173) calves in each herd were sampled. The d 38 samples were analyzed by PCR (IDEXX Realtime PCR BVDV) and 2 antigen ELISA (IDEXX BVDV Ag Serum Plus and IDEXX BVDV PI X2) tests. Calves testing positive for any of these tests at d 38 were bled at d ~100 of age. Day 100 samples were tested for BVDV antigen on the ELISA tests. Earlier (d 3, 10, 24) samples from calves testing positive at d 38 were also tested by antigen ELISA and PCR.

The ear samples were frozen at -4°F (-20°C) until subsequent processing for presence of BVDV using a validated polymerase chain reaction (PCR) test (IDEXX Real time PCR BVDV) with testing performed by a commercial veterinary laboratory (IDEXX, Palmerston North, New Zealand). Calves were defined as PI if they were antigen test-positive at d 38 and 100, or transiently infected (TI) if antigen test-positive at d 38, but not d 100.

Results

A total of 26 of 1030 (2.5%) calves tested positive for BVDV at d 38. There was significant (P<0.001) variation among herds in the prevalence of test-positive calves, with 5 of 11 (45%) of herds having 1 or more positive calves. A total of 2 of 3, and 3 of 8 herds that were selected based on identification of BVDV via positive animals or via BVDV positive bulk-tank milk, respectively, had BVDV-positive calves. One additional calf was test-positive by antigen ELISA at d 38. 5 of the 26 PCR-positive calves from 3 different herds were defined as PI and were test-positive upon ELISA and PCR at d 3, 10, 24, and 100. The TI calves were antigen ELISA test-negative at all time points. Using PI status as the gold standard, the 2 antigen ELISA tests had 100% sensitivity and specificity for differentiating TI vs PI vs uninfected calves. The age of calves at testing did not affect the sensitivity or specificity of antigen ELISA or PCR test results.

Significance

BVDV PCR-positive calves were found in nearly half (45%) of the herds with a previous BVDV history. Over the entire population the average prevalence was 2.5%, but there was significant variation among herds, with the within-herd prevalence ranging from 0 to 12% of calves. There was no evidence of reduced sensitivity of the IDEXX ELISA or PCR tests for detecting BVD PI calves irrespective of the age of the calf. In this study the age of the calf did not affect the ability to detect a PI. The antigen ELISA tests were superior to PCR for differentiating between PI and TI calves.