

Apparent Prevalence of Congenital Infections in Calves Born on a Single California Dairy Herd

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Introduction

The placenta in cattle prevents in utero transfer of maternal immunoglobulins and leukocytes to the fetus. The fetal immune system, on the other hand, can be exposed to pathogens that cross the placental barrier and mount an immune response to bovine leukosis virus (BLV), infectious bovine rhinotracheitis (IBR), bovine viral diarrhea (BVD) types 1 and 2, *Neospora caninum* (NC), *Leptospira hardjo* (LH), and *Leptospira Pomona* (LP). The objective of this study was to determine the apparent prevalence of congenital infections to common infectious pathogens in calves.

Materials and Methods

The subjects were all calves born on August 9, 2010 in a 5,000-milking-Holstein herd in California. Whole blood samples were collected via the jugular vein of each newborn calf immediately after birth and prior to ingestion of colostrum, and similarly from the dams after calving. All dams were vaccinated at 211 days carried calf with an *E. coli* bacterin (UPJOHN J-5 Bacterin, Pfizer) and a vaccine for *E. coli*, rota, corona and *C. perfringens* type C (Scour Bos 9, Novartis). One month prior to calving, cows were vaccinated with another dose of *E. coli* bacterin and a *Clostridium* species bacterin-toxoid (Alpha-7, Boehringer Ingelheim Vetmedica). Blood samples were stored on ice until serum was harvested by centrifugation and stored at -94°F (-70°C). The IgG content of pre-colostral serum samples was determined using radial immunodiffusion (RID) assay. Seroconversion to BLV (ELISA followed by AGID confirmation), NC (enzyme linked immunosorbent assay, ELISA), BVD types 1 and 2 (serum virus neutralization, SVN), IBR (SVN), *Mycobacterium avium* subsp *paratuberculosis* (MAP) (ELISA), LH and LP (microscopic agglutination test, MAT) was determined and the prevalence for each pathogen calculated.

Results

A total of 21 calves were born during the 24-hour period on the study dairy, two of which were twins. Six of

the calves had trace amounts of IgG in their pre-colostral serum samples (28.6%). *BLV*: One (4.8%) calf tested positive for BLV antibodies and was confirmed positive by AGID test. Of the 20 dams that gave birth to a calf, 12 (60%) tested positive for BLV antibodies by ELISA and AGID test (60%). *NC*: Although no calves tested positive for antibodies against NC, six (30%) of the dams were positive for NC antibodies. *BVD types 1 and 2*: All calves tested negative for antibodies against BVD types 1 and 2; however, all (100%) dams tested positive for antibodies against both sub-types of BVD, which could be explained by vaccination against BVD virus.

IBR: Although all calves and two dams tested negative for antibodies against IBR, 18 dams (90%) were positive for IBR antibodies, which was explained by vaccination against IBR.

MAP: Two calves had sample-to-positive (S/P) ratios below the cutoff for a positive result; hence all the calves and their dams were negative for MAP antibodies.

LH and LP: Two (10%) dams tested positive for LH antibodies, one of which also tested positive for LP antibodies (5%). The remaining dams and calves tested negative for both LH and LP antibodies.

Significance

The present study is the first report on the apparent prevalence of congenital exposures in a large California herd based on a cohort of calves. Twenty-nine percent of calves tested had pre-colostral IgG concentration levels, suggesting evidence of congenital exposures to at least one pathogen. A 60% prevalence of BLV in dams is not surprising. Despite the elevated prevalence (30%) of NC in the study herd, none of the calves born tested positive for NC. This may reflect evidence of previous exposure and successful neutralization of NC infections by the dams. The lack of MAP-antibody positive dams suggests that the two calves with non-zero S/P ratios on ELISA are probably true negatives. The lack of antibodies in calves against BVD, IBR and *Leptospira*, given that their dams tested positive for the same pathogens, may be difficult to interpret due to the uncertainty regarding natural challenge by these pathogens during pregnancy.