

# Identification and determination of the antimicrobial susceptibility of the main respiratory pathogens isolated from calves in dairy herds with respiratory diseases in Québec

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## Introduction

Bovine respiratory disease (BRD) represents 1 of the 2 most important causes of morbidity and death in dairy calves. The detrimental effects of BRD in calves on dairy herds can be substantial and includes decreased profitability because of cost of treatments, decreased growth rate, increased risk of culling before first calving, and death. Calf enzootic pneumonia is associated with multiple bacterial and viral pathogens. In the past 10 years, emerging and re-emerging respiratory pathogens, such as bovine respiratory syncytial virus (BRSV), bovine coronavirus (BCV), and *Mycoplasma bovis*, have been identified as playing a major role in the development of BRD in dairy calves in North America. Field data regarding the prevalence of various BRD pathogens in dairy calves, particularly calves on small farms, are lacking. The objectives of this study were to identify the primary respiratory pathogens isolated from calves with BRD in Québec dairy herds and to determine the antimicrobial susceptibility of those pathogens.

## Materials and Methods

In November 2012, a cross-sectional study was performed using a convenience sample of 11 dairy herds (10 with enzootic BRD in calves and 1 without a history of enzootic BRD in calves on the basis of reports from the producer and herd veterinarian). A maximum of 10 preweaned calves from each herd were enrolled in the study. Calves were assigned a respiratory score in accordance with the Calf Respiratory Health Score (CRHS) system developed by the University of Wisconsin. From each calf, a nasopharyngeal swab specimen was obtained for isolation of bacterial pathogens by means of aerobic bacterial culture, as well as cultures specific for

*Histophilus somni* and *M. bovis*. A nasal swab was also obtained for detection of BCV, BRSV, infectious bovine rhinotracheitis virus (IBR), parainfluenza virus type 3 (PI3), and bovine viral diarrhoea virus (BVDV) by

means of PCR assay, and *M. bovis* by means of culture and PCR assay. Antimicrobial susceptibility testing was performed with the Kirby-Bauer technique in accordance with the Clinical and Laboratory Standards Institute (CLSI) recommendations for bacterial respiratory pathogens including *Pasteurella multocida*, *Mannheimia haemolytica*, and *H. somni*. The antibiotics evaluated in the susceptibility test included ampicillin (not tested for *H. somni*), ampicillin-sulbactam (not tested for *H. somni*), ceftiofur, enrofloxacin, erythromycin (not tested for *H. somni*), florfenicol, penicillin, spectinomycin, tetracycline, tilmicosin, trimethoprim-sulfamethaxazole, and tulathromycin.

## Results

Of the 95 calves that were sampled, 47 (49%) were considered to have BRD on the basis of the CRHS, including 5 of 10 calves from the herd without a history of enzootic BRD.

*Pasteurella multocida*, *M. haemolytica* and *H. somni* were isolated from 53, 17, and 12 calves, respectively; and *P. multocida*, *M. haemolytica*, and *H. somni* were isolated from at least 1 calf on 10, 5, and 3 herds, respectively. *Mycoplasma bovis* was identified by culture or PCR assay in 19 calves, and 5 herds had at least 1 *M. bovis*-positive calf. Bovine coronavirus was detected in 38 calves from 7 different herds, and BRSV was detected in 1 calf. Infectious bovine rhinotracheitis virus, BVDV and PI3 were not detected in any calf. Antibiotic susceptibility testing was performed on 51 *P. multocida* isolates from 6 herds, of which 17 and 1 had intermediate susceptibility to erythromycin and tilmicosin, respectively; 1 was resistant to erythromycin; and 1 was resistant to tilmicosin. All 15 *M. haemolytica* isolates evaluated had intermediate susceptibility to erythromycin, and 1 had intermediate susceptibility to tulathromycin. Of the 12 *H. somni* isolates tested, none were resistant to any of the antimicrobials evaluated.

## Significance

As expected, *P. multocida* was the most frequently isolated bacteria in this study; however, *M. haemolytica*, *H. somni*, and *M. bovis* were also frequently isolated and should be considered when BRD control programs are developed for Québec dairy herds. Bovine coronavirus, which was not included in the vaccination protocols used

on any of the study farms, was the only virus detected with the exception of 1 calf that tested positive for BRSV. Further investigations are needed to elucidate the importance of BCV in BRD. Most of the bacteria isolated in this study were sensitive to the antimicrobials commonly used for the treatment of calves with BRD, although a low level of resistance was observed for antimicrobials in the macrolide family.