Prevalence of respiratory pathogens and diseases in dairy heifers at two different moments in their preweaning period

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Introduction

The health of pre-weaned dairy heifers is crucial for the future of a herd. Understanding the dynamic of diseases and pathogens affecting heifers can help farmers and veterinarians to choose management and prevention practices. The objective of this study was to quantify and compare the prevalence of respiratory pathogens and diseases at 2 moments during their preweaning period.

Materials and methods

This pilot prospective cohort study was conducted between August 2018 and September 2019. A total of 19 herds (convenience sample) were enrolled. Within each herd, 10 heifers were examined twice: in the first 2 weeks of life (exam 1), and at 4 to 8 weeks of age (exam 2). For both exams, Wisconsin respiratory health score and lung consolidation were assessed; nasopharyngeal swabs and blood samples were also collected. Failure of transfer of passive immunity (FTPI) was defined as a serum Brix result < 8.4% for heifers 1 to 10 days old. Clinical pneumonia was defined as a respiratory health score ≥ 5, while subclinical pneumonia was defined as a respiratory health score < 5 and lung consolidation ≥ 1 cm (ultrasound). Nasopharyngeal samples were used to identify *Pasteurella multocida, Mannheimia haemolytica*, and *Histophilus somni* using conventional culture, and Mycoplasma bovis, bovine respiratory syncytial virus (BRSV), parainfluenza virus type 3 (PI3), infectious bovine rhinotracheitis virus (IBR), bovine viral diarrhea virus (BVDV), and bovine coronavirus (BCV) using PCR. Mixed logistic regression models including herd as a random intercept were used to assess the difference between exams 1 and 2 for each disease and pathogen, as well as the association between the identification of at least one pathogen and clinical disease.

Results

A total of 198 heifers from 1 to 14 days old (median = 5; exam 1) were enrolled from 20 herds, and 182 of them were examined again at 28 to 56 days old (median = 55; exam 2). At exam[1], the incidence risk of clinical and subclinical pneumonia was 6%, and 14%, respectively. Respiratory pathogens were found in 26% of healthy heifers, but heifers with clinical pneumonia tended to be 5 times more likely to be positive to at least one respiratory pathogen (95% CI = 1 – 25; *P* = 0.06). At the herd-level, the median herd prevalence of FTPI, clinical and subclinical pneumonia were 38% (18-70), 0% (0-33) and 10% (0-33), respectively. For each pathogen, no heifers were positive in more than half the herds (median = 0%). Pathogens were however identified in some herds, and *P. multocida* had the highest maximum herd prevalence (80%).

At exam 2, the incidence risk of clinical and subclinical pneumonia was 25% and 41%, respectively. Respiratory pathogens were found in 70% of healthy heifers, and there was no association between the identification of at least one respiratory pathogens and clinical pneumonia. At the herd level, the median herd prevalence of clinical and subclinical pneumonia was 22% (0-67) and 40% (0-60), respectively. Again, more than half the herds had no heifer positive to each pathogen (median = 0%), and *P. multocida* had the highest maximum herd prevalence (89%), followed by *M. bovis* (80%).

When comparing exams, heifers were 5 and 4 times more likely to have clinical (95% CI = 3 – 11; *P* < 0.01) and subclinical pneumonia (95% CI = 2 – 7; *P* < 0.01), respectively, at exam 2 than exam 1. They were also more likely to be positive to *P. multocida* (OR = 9; 95% CI = 5 – 17; *P* < 0.01) and *M. bovis* (OR = 4; 95% CI = 1 – 13; *P* = 0.03) at exam 2 than exam 1.

Significance

In this study, there was a wide distribution of different respiratory pathogens and diseases prevalence in herds. The calf-level analyses showed the presence of respiratory pathogens and diseases was greater in 4 to 8-week-old heifers than in 0 to 2-week old ones. Moreover, sick animals were more likely to be positive for pathogens at exam 1, but not at exam 2. At both examination times, respiratory pathogens were found in healthy animals.