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Abstract

Immunoglobulin (Ig) concentrations in serurn and in nasal secretions were correlated with pneumonia and diarrhea during the first 12 wk of life of dairy calves. The peak onset of pneumonia occurred between 2 and 4 wk of age when the calves' serum Ig G1, Ig G2 and IgA concentrations were lowest. As IgG2 concentrations increased, fewer calves developed pneumonia. Peak onset of pneumonia was also correlated with the lowest IgG and IgA concentrations in the calves' nasal secretions. Diarrhea often preceded pneumonia.; Dairy Day, 1984, Kansas State University, Manhattan, KS, 1984;

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IMMUNOGLOBULIN CONCENTRATIONS IN SERUM AND NASAL SECRETIONS OF CALVES AT THE ONSET OF PNEUMONIA

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Summary

Immunoglobulin (Ig) concentrations in serum and in nasal secretions were correlated with pneumonia and diarrhea during the first 12 wk of life of dairy calves. The peak onset of pneumonia occurred between 2 and 4 wk of age when the calves' serum Ig G1, Ig G2 and IgA concentrations were lowest. As IgG2 concentrations increased, fewer calves developed pneumonia. Peak onset of pneumonia was also correlated with the lowest IgG and IgA concentrations in the calves' nasal secretions. Diarrhea often preceded pneumonia.

Introduction

Respiratory disease is one of the more serious problems affecting dairy calves. This problem often occurs between 1 and 5 mo of age, a period coinciding with the usual low point in serum Ig concentrations. A correlation had been demonstrated between low Ig concentrations in the first wk of life and pneumonia at 2 or 3 mo of age; however, it was not determined whether the pneumonia coincided with the lowest Ig concentration in serum of individual calves, or whether the concentration of a particular Ig class in serum or in respiratory tract secretions could be correlated with the onset of pneumonia. Diarrhea in the first wk of life may also be correlated with pneumonia at a later age.

The purpose of this study was to evaluate the relationship between diarrhea and pneumonia and the relationship between low Ig values in serum and nasal secretions and the development of pneumonia.

Procedure

Seventy-nine Holstein calves were evaluated twice daily for degree of scouring, feed consumption and clinical signs of disease such as blood in feces, rapid respiratory rate, elevated temperature, cough, or nasal exudate. Calf weights were determined weekly. The calves were housed in elevated stalls in a controlled environment building and were fed milk replacer (study A) or milk (study B).

Weekly serum and nasal secretions were collected and immunoglobulin concentrations determined by radial immunodiffusion.

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A criterion for diagnosis of pneumonia was developed. Pneumonia was characterized by fever, increased respiration rate, mild-to-severe depression, coughing, nasal discharge, serous ocular discharge, and dry or moist rales. When calves died, presence of pneumonia was confirmed at necropsy.

Results

All calves with pneumonia either had rectal temperature over 39.9C for one day, from 39.7 to 39.9C for 2 days consecutively, or 39.4 to 39.7C for 3 days consecutively and none of the calves without pneumonia had rectal temperatures within one of those categories.

In studies A and B, 58% of calves had diarrhea before pneumonia and 70% of calves had diarrhea before or starting on the same day as pneumonia. The wk with the highest occurrence of diarrhea preceded the wk with the highest occurrence of fever.

Serum Ig G1, Ig G2, IgM, and IgA declined to lowest values at 3 wk of age when peak prevalence of pneumonia occurred. IgA and IgM levels remained low, while Ig G2 concentrations increased markedly to maximum values at 11 wk of age. Most calves developed pneumonia when serum concentrations of Ig G1 were < 1.5 g/dl, Ig G2 < .3 g/dl, IgA < .1 g/dl, and IgM < .2 g/dl and when the combined IgG and IgA values in nasal secretions were < .2 mg of Ig/mg of protein.