

## **EPIDEMIOLOGY OF ENZOOTIC PNEUMONIA IN MINNESOTA DAIRY CALVES**

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### **Introduction**

Enzootic calf pneumonia (ECP) is one clinical manifestation of the bovine respiratory disease complex. Enzootic calf pneumonia results from a complex interaction between environmental factors, host factors, and infectious agents. The financial losses that result from ECP occur due to death loss, treatment cost, and decreased lifetime milk production. Calves that have experienced ECP have been shown to be at increased risk of culling once in the milking herd when compared to herdmates of the same age(1). Experimental studies involving the infectious agents themselves have been performed(2-9), as well as retrospective(10-16) and cohort studies(17-22). None of the current epidemiologic research has specifically targeted ECP, either through assessment of ventilation or laboratory sampling to validate morbidity or mortality.

### **Materials and Methods**

Thirty dairy herds enrolled in the Minnesota Dairy Herd Improvement Association (DHIA) were studied for sixteen months. These randomly selected herds were located in two counties in Minnesota. The two counties are representative of all Minnesota dairy herds, based on milk production, farm size, and cattle numbers. Producers with a variety of management abilities were included. A pretested questionnaire was administered to the cooperating producers to determine their calf management practices. Adequacy of calf housing was assessed according to type, location, division of age groups, ventilation adequacy, frequency of manure removal, and stocking density. Check-off forms were provided for recording individual calf data from birth to sixteen weeks of age for all heifer calves born on each farm during the study period. Monthly herd visits were conducted to collect check-off forms, and to collect serum samples for Infectious bovine rhinotracheitis (IBR), Bovine viral diarrhea virus (BVD), Parainfluenza virus (PI3), and Bovine respiratory syncytial virus (BRSV). Every second

calf born on each farm was sampled monthly from birth to sixteen weeks of age. Physical examinations were performed on heifer calves sampled on monthly visits. Included in this examination was auscultation of the lungs and estimation of body weight using a weight tape. As many heifer calves as possible that died between birth and sixteen weeks of age during the study were retrieved and necropsied at the Minnesota Diagnostic Laboratory.

## Results

Complete health information was obtained for 845 heifer calves born live during the study period. Sixty four calves died during the study period, yielding a mortality rate for all farms of 6.7% (0-7%, +/- 2.01). Diarrhea was the most common cause of mortality (28, 44% of all deaths), followed by pneumonia (19, 30% of all deaths). Deaths due to other gastrointestinal conditions included bloat (3), atresia coli (2), abomasal rupture (2), and mesenteric root volvulus(1). Four calves died due to injury, two calves were septic, and four calves died from unknown causes. The most commonly isolated pathogen from pneumonic lungs from calves that died during the study was Pasteurella haemolytica. One hundred and eighty eight calves were treated on all farms, resulting in a crude morbidity rate of 22.3%. Enteritis was the most common disease diagnosed (124 cases, 14.7% of all calves), followed by respiratory disease (55, 6.5% of all calves), navel ill (4), depression/off feed (3), musculoskeletal disease (1) and ringworm (1). Analysis to date has shown that calves housed where ventilation is inadequate grow more slowly compared to calves housed in adequately ventilated areas. Areas of future analysis will include the impact of individual calf and herd level risk factors on the incidence of ECP.

## Conclusions

Although increased respiratory rate and fever in the absence of other clinical signs are the most sensitive indicators of enzootic calf pneumonia, producers are unwilling to invest the time needed to take rectal temperatures on a regular basis. The initial stages of the disease are missed, and only those cases which progress to more obvious clinical signs (ie persistent cough, nasal discharge, or inappetence) are detected. Enzootic calf pneumonia was most often a subclinical entity in the herds studied, with the most objective result being decreased rates of gain in affected calves.

On farms where ventilation of calf housing was determined to be inadequate and in the absence of other calfhood diseases, calves grew more slowly when compared to calves from farms that were raised in housing with adequate ventilation, given that nutrition was adequate on all farms. Because of the economic loss associated with ECP, producers should optimize the environment of this "forgotten segment" of the dairy herd, so that they may reach their full potential.

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The objectives of this study were to describe the epidemiology of enzootic calf pneumonia in Holstein dairy calves from birth to sixteen weeks of age on thirty dairy farms in southeast Minnesota. Thirty dairy herds enrolled in the Minnesota Dairy Herd Improvement Association (DHIA) were studied for sixteen months. A pretested questionnaire was administered to the cooperating producers to determine their calf management practices. Check-off forms were provided for recording individual calf data from birth to sixteen weeks of age for all heifer calves born on each farm during the study period. Monthly herd visits were conducted to collect check-off forms, and to examine calves involved in the study.

Complete health information was obtained for 845 heifer calves born live during the study period. Sixty four calves died during the study, yielding a mortality rate for all farms of 6.7%. Most deaths were due to diarrhea (28), followed by pneumonia (19). Enteritis was the most common cause of morbidity, followed by respiratory disease. Enzootic pneumonia was most often a subclinical entity in the herds studied. On farms where ventilation of calf housing was inadequate calves grew more slowly when compared to calves from farms that were raised in housing with adequate ventilation. Ventilation of housing is an important risk factor in the epidemiology of enzootic calf pneumonia.

El objetivo de este estudio fue describir la epidemiología de la neumonía enzoótica en terneros Holstein desde su nacimiento hasta las 16 semanas de edad en fincas lecheras del sureste de Minnesota. Durante 16 meses fueron estudiadas treinta fincas lecheras, inscritas en "The Minnesota Dairy Herd Improvement Association" (DHIA). Para determinar las prácticas de manejo de los terneros, los productores participantes llenaron un cuestionario el cual había sido previamente probado. Para recolectar los datos individuales desde el nacimiento hasta las 16 semanas de edad de todas las terneras nacidas en cada finca, durante el período de estudio, se llenaron formularios individuales. Las fincas fueron visitadas mensualmente para recoger los formularios y examinar las terneras involucradas en el estudio.

Durante el período estudiado se obtuvo información completa sobre la sanidad de 845 terneras, de las cuales 64 murieron determinando un 6.7% de mortalidad para el total de las fincas. La mayoría de las muertes se debieron a diarrea (28), seguidas por neumonía (19). La enteritis fue la causa más común de morbilidad, seguida por enfermedades respiratorias. La neumonía enzoótica se presentó más frecuentemente como una entidad subclínica. El crecimiento de las terneras fue más lento en las fincas con ventilación inadecuada en el alojamiento, comparado con las de fincas con adecuada ventilación. Por lo tanto, en la epidemiología de la neumonía enzoótica de los terneros la ventilación del alojamiento es un importante factor de riesgo.

L'objectif de la présente étude est de décrire l'épidémiologie de la pneumonie enzootique du veau de la naissance à seize semaines d'âge dans les élevages laitiers au sud-est du Minnesota. L'étude a été réalisée sur seize mois, dans trente (30) élevages Holsteins appartenant à l'association "Minnesota Dairy Herd Improvement" (DHIA). Un questionnaire préalablement testé, a été distribué aux éleveurs pour déterminer le type de conduite de l'élevage des veaux. Des formulaires ont été distribués aux éleveurs pour l'enregistrement des données de la naissance jusqu'à 6 semaines d'âge pour toutes les velles nées au cours de la période d'étude. Ces fiches ont été collectées au cours des visites mensuelles réalisées dans le but d'examiner les velles.

Les informations complètes ont concerné 845 velles nées durant la période d'étude. Le taux de mortalité enregistré au cours de l'étude était de 6.7% soit soixante quatre (64) velles mortes. La cause principale de mortalité était la diarrhée (28) suivie de la pneumonie (19). Les entérites constituaient la majeure cause de pneumonie enzootique a été observée principalement sous forme subclinique dans les élevages étudiés. La croissance des velles était plus lente dans les étables à mauvaise ventilation que dans celles à bonne ventilation. La ventilation de l'étable est un important facteur de risque dans l'épidémiologie de la pneumonie enzootique du veau.