Calf pneumonia — new technology to automatically monitor calf housing and its effects on calf health and growth rate

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Summary

- A new UCD-Teagasc calf pneumonia study is testing automatic monitoring of ventilation in calf housing.
- Eight farms (450 calves) with a history of calf pneumonia have been enrolled onto the three year study in 2019.
- Real-time, remote, environmental monitors have been installed both outside and inside the calf housing.
- The calves' immunity, infection, health and growth rates are being recorded every three weeks during housing.

Introduction

An exciting new animal health research project has just started at Moorepark. In collaboration with the Veterinary Faculty in UCD, Teagasc is participating in a multi-site study on calf pneumonia in spring 2019. We are investigating the possibility of automatically monitoring both the external and internal calf house environments and how these affect calf growth, immunity and health, in particular risk of pneumonia. To-date, precision livestock farming (PLF) has concentrated on cow applications (e.g. automated heat detection); this is the first application of PLF for calf heath in Ireland.

Pneumonia is the primary cause of mortality and a major cause of illthrift and antimicrobial usage in calves of one month of age and older. While it is normal for dairy calves to carry respiratory pathogens, pneumonia is precipitated by various stressors. One of the critical stressors is the calf's environment, especially ventilation, particularly at calf-level (the microenvironment).

Research study

Eight dairy farms around the country which have automatic calf feeders and a history of calf pneumonia have been enrolled in this longitudinal three year study. On each site real-time, remote environmental monitors have been installed both outside and inside the calf housing. These weather stations will automatically record air temperature, relative humidity, wind speed and various gas concentrations (e.g. ammonia, CO_2) using multi-diagnostic sensors 24 hours/day for the entire housing period. Every three weeks, the farms are being visited and the calves (n=450) examined. All calves are being weighed, temperature-checked and health-scored. In a subsample of calves, thoracic ultrasonography is being used (for the first time in Ireland) to assess lung pathology and blood and nasal mucus samples are being collected. The blood will be examined for evidence of failure of passive transfer of colostral antibodies, inflammatory markers and antibodies to respiratory pathogens. The nasal samples will be used to detect inflammatory mediators and the presence of respiratory pathogens. The farmers are keeping records of feed intake and all calf treatments.

The data from the 450 calves will be used to establish the relationships between environmental conditions and mucosal immunity, pathogen carriage, pneumonia (whilst accounting for passive transfer) and calf growth rates. This is a pilot study the results from which will be used to design a cross-sectional study on a larger number of dairy farms nationally.

The ultimate aim of these studies is to develop evidence-based guidelines for the construction of new, and the modification of existing calf housing to reduce the incidence of pneumonia (Figure 1), improve calf growth rates and reduce antimicrobial use in Irish dairy herds.

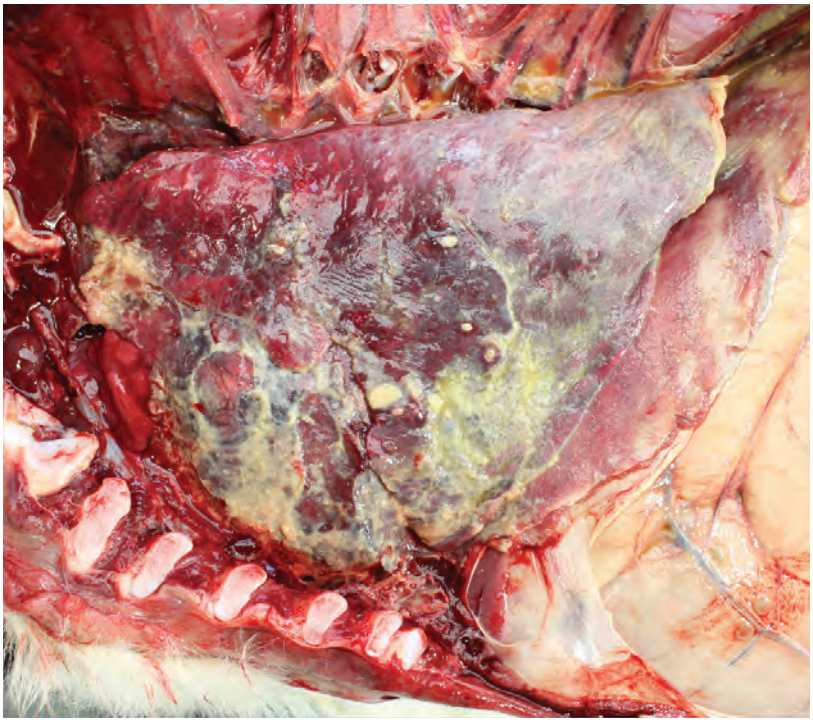

Figure 1. *Pneumonia is the number one cause of death in calves over month old Photo shows severe pneumonia (infection of the lungs) and pleurisy (inflammation of the lung surface)*

Conclusions

Calf pneumonia is a major animal health problem on dairy farms contributing greatly to increased antimicrobial use. Prevention of respiratory disease in calves through automated housing environmental monitoring combined with modern diagnostic techniques may reduce antimicrobial use and hence, risk of anti-microbial resistance (AMR).