Impact of housing environment on calf respiratory disease

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Summary

- Bovine respiratory disease is often linked to the air quality and environment in calf housing but there is limited evidence for these links.
- A detailed search of the scientific literature identified several important parameters.
- Dust, ammonia, draughts and poor bedding management were identified as some of the factors with the strongest evidence for increasing the risk of bovine respiratory disease in calf housing.

Introduction

Bovine respiratory disease (BRD) in preweaning dairy calves presents a challenge to many dairy farmers in Ireland. Although calf housing environment is often cited as a major influence on the level of BRD on a given farm, the research in this area has not been drawn together to give a broader picture. For this reason, Teagasc and UCD undertook a detailed review of the scientific literature to identify which housing environmental factors had the strongest link to BRD.

Parameters

As part of the review eight key parameters were identified that have been measured in previous work and related to the risk of BRD in calves:

- Air ammonia
- Dust
- Microbial air contamination
- Draught
- Temperature
- Relative humidity
- Ventilation
- Bedding

Ammonia

Ammonia is a noxious gas that is produced when urine is broken down by bacteria in soiled bedding. Recent work showed that prolonged exposure to high concentrations of ammonia was associated with higher risk of lung lesions in calves. Ammonia build up can be avoided by good drainage and regular removal of soiled bedding.

Dust

Dust build up in the air of a calf house can be a result of poor ventilation or due to use of a straw blower or dusty feeds. Airborne dust can be inhaled by calves and result in irritation of the respiratory tract. High levels of dust was found to be associated with lung lesions. Dust producing practices should be avoided in calf housing.

Microbial air contamination

Microbial air contamination can occur through numerous routes, primarily it is thought that calves and bedding contribute most to the air contamination. The evidence for its relationship with BRD risk is not as strong as other environmental parameters. It is considered a proxy for risk of transmission of airborne BRD pathogens. Good ventilation is the best way to reduce microbial air contamination.

Draughts

Draughts are defined as air speed greater than 0.5 - 0.8 m/s at calf level; there is strong evidence to suggest that exposure to draughts increases the risk of BRD. Draughts are more likely to be found in calf housing that is overly open or particularly exposed.

Temperature

The relationship between ambient temperature and BRD risk is complex and appears to be modified by other factors such as bedding, nutrition and relative humidity. Both high and low temperature in a calf house may increase the risk of BRD but a range in which calves are at reduced risk could not be identified.

Relative humidity

High relative humidity is often considered a risk for BRD as it may facilitate longer survival of pathogens in air and suggests a damp environment that might increase thermal strain on calves. The evidence to support this relationship was found to be weak, but like temperature, it is likely that the relationship between relative humidity and BRD is complex and requires more investigation.

Ventilation

Ventilation rates were only measured in one study in this review, which did not find a relationship to BRD risk. However, ventilation is still likely to be very important, as it will reduce the build-up of pollutants such as ammonia, dust and microbial contamination.

Bedding

Deep wet pack bedding under calves was associated with increased risk of BRD, most likely due to increased production of ammonia and possibly increased microbial air contamination. It was found that when calves were generously bedded (legs not visible when lying down) this was protective against BRD, most likely because it acts as insulation against lower ambient temperature.

Conclusions

High levels of air pollutants such as dust and ammonia should be avoided. Calves require protection from draughts and generous amounts of dry bedding. More research is required in this area to better understand the relationship between temperature, humidity and BRD.

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