

Monitoring the calves' micro climate to protect lung health

Naturally-ventilated calf barns have many benefits, but also risks that can threaten calf lung health.

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Lung problems in dairy calves often require veterinary treatment and cause lesions or 'consolidation' as shown by ultrasound.

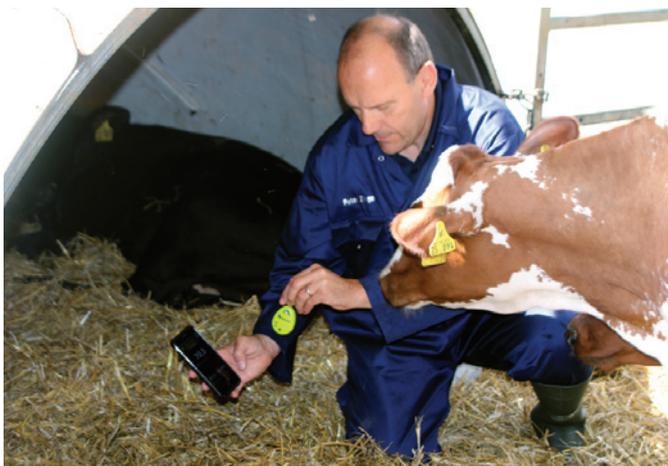
When these animals enter the milking herd, their milk production can be much lower, even averaging a first lactation loss as much as 525kg according to a recent university study in the USA.

The 'micro climate' surrounding calves plays a critical role in calf lung health.

Diamond V dairy advisors in Europe use a 'calf climate audit' to help producers make proactive, informed decisions about the calf micro climate, which is especially important in naturally-ventilated calf housing. We inspect:

- Bedding quality and space.
- Bacterial air count (BAC).
- Wind speed and air change.
- Temperature and humidity.

Accurately monitoring calf rearing conditions today makes use of a climate data logger and smart phone.



Bedding quality and space

To describe calves' bedding quality, the University of Wisconsin developed a grading scale and score for 'nesting'. The scale ranges from nesting score one, indicating poor quality, to score three, which is excellent and desirable.

Generally, when good quality straw or hay is used as bedding material, calves can 'sink' or nestle into the bedding rather than lying on top of it. Such bedding has a nesting score of three.

Good bedding quality helps with a healthy micro climate, where the calf can keep body temperature constant while air flows easily above the calf, diluting dust and total BAC.

Along with bedding, adequate lying space is important for the calf micro climate. We aim to achieve at least 2.5m³ per calf. If the calf has less space, then we can expect a higher BAC.

Bacterial air count

Research from Wisconsin found that a total BAC of less than 15,000 cfu/m³ air (colony forming units per cubic meter of air) lowers the risk of lung problems.

The researchers described a nearly linear relationship between



Bacterial air count (BAC) sampling and culturing.

Wind speed and air change

increasing BAC and the proportion of calves with respiratory disease.

As part of Diamond V's calf climate audit, we conduct five-litre air samplings of hutches, calf pens or boxes, or group housings.

To measure the air, we use a device specifically calibrated to sample low quantities of air, which provides us with a very precise count of total bacteria.

Following sampling, we culture the bacteria for 12-32 hours.

As part of micro climate monitoring, we also measure wind in the housing systems with a high tech anemometer that can identify air speeds down to 0.01m/s (metre per second). Air speed of more than 0.5m/s can cause a chill, which can make calves even more vulnerable to health challenges.

In practice, we see more instances of still air. But in the worst micro climates, air velocity is far too high. In order to demonstrate wind speed

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Calf bedding with a nesting score of three – generally the legs are not visible when the calf lies down (photo courtesy of Ken Nordlund, University of Wisconsin).





In the winter, we hope to see the fog dissipate within 15 minutes, whereas during the summer, an efficient calf barn will complete the dissipation in less than a minute.

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and air change movement, we can use a fog-producing device and measure how long it takes for the resulting fog to fade out of the calf barn.

Temperature and humidity monitoring

We also use climate data loggers to monitor the conditions in the calf barn, usually installing a logger two

weeks prior to the time when we visit the herd. To install, the device is hung in the middle of the barn.

Based on the data logger results, we discuss the 'inside barn weather conditions' with the producer and try to plot these conditions against health events that occurred during the same time period. It often turns out that temperature and humidity fluctuations seem to cause more lung problems than periods of constant climate.

Also, if the dew point turns out to



The climate data logger is a small instrument that communicates temperature and humidity conditions via a smartphone app, allowing easy data collection and evaluation.

be low, it is a proof of a higher air-to-water condensation, which can result in a higher risk of calf lung health challenges.

Conclusion

Taking these calf climate observations together, we can offer the producer and the veterinarian or other consultants a unique diagnostic service, discussing improvements and offering practical

advice. However, we stress that a micro climate audit is just one method to improve the calf rearing process, along with assessment of calf hygiene, overall herd health and well-being, and comfort conditions.

This comprehensive and holistic approach helps us take a more complete look at how calves are raised as well as keeping an open discussion about how to continue aiming for better performance for their lifespan as high-producing cows. ■