Good ventilation in calf housing can eliminate barriers to calf performance

by Bernd Kleiner, Business Development Manager/Managing Director, Calf-Tel/L.T. Hampel GmbH, Germany.

Research has shown that quality ventilation in calf housing is one of the keys to building a productive dairy herd. Unfortunately, the topic is such a broad one it can be hard to pin down what 'good ventilation' means. To further complicate things, ventilation needs can change depending on the season and on an individual calf's requirements. Regardless, following a few basic rules in designing calf housing can help you improve ventilation to promote calf performance and – in the future – cow performance.

Before reviewing the potential stressors, let us dispel two myths about ventilation. First, 'ventilation' does not only mean 'air movement'. Using fans to move air around inside a building is not providing adequate ventilation. Rather, ventilation is the means of exchanging stagnant air for fresh air. Air movement might make the air inside calf housing feel cooler when temperatures are high, but if the fans are not working to replace the air inside the housing, they are not truly benefiting the calves.

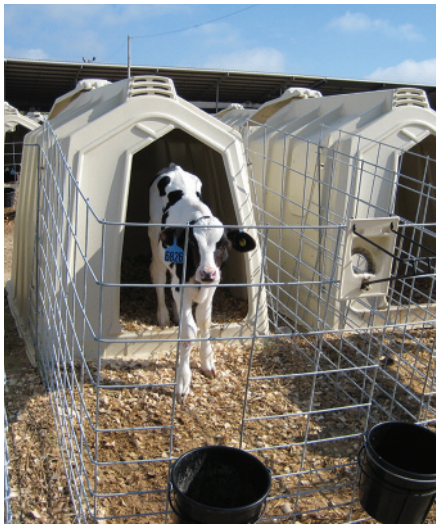
In addition, ventilation is not a requirement to keep calves cool. In fact, a well ventilated calf hutch is often the same temperature as a poorly ventilated hutch, providing they are both opaque.

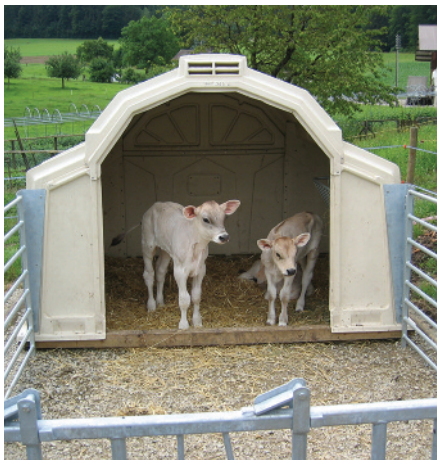
For optimum calf performance, air should be exchanged 10 times per hour (at a minimum) for the majority of the year and up to 60 times per hour in the summer. This allows you to potentially mitigate a number of factors that could stress growing calves including disease-causing pathogens, noxious gases and humidity.

Minimising these external stressors may allow calves to focus their energy internally on growing and reaching their maximum performance potential.

This article looks at a few of these stress factors, their negative impacts on calf success and housing designs to eliminate them.

When purchasing outdoor hutches, look for systems that have the largest possible ventilation opening, preferably near the top of the back wall of the hutch.





The inside of a translucent hutch that is penetrated by the sun could be as much as 8°C (15°F) warmer than inside an opaque hutch with the same ventilation.

Humidity

- **Calf impact:**

Reduced ability to regulate body heat, reduced feed intake, reduced rate of gain, increased breathing rate, reduced rumen development and more.

- **Ventilation solution:**

In most buildings, well designed natural ventilation is sufficient. As the warm air rises from calf pens, it will naturally draw in fresh air through intake vents. If additional ventilation is necessary, fans should only be controlled manually or by humidity sensors, never by a thermostat. When temperatures are moderate to low in both indoor and outdoor calf housing, be sure that air movement through a calf's living space is below average walking speed, which is about 5km (3 miles) per hour.

- **Details:**

We often think of humidity as a partner of hot weather. However, high humidity can be dangerous for calves during cold weather, too. In this case, the moisture in the air comes not from the weather but from the calf herself. Calves produce as much as 7.6 litres (two gallons) of water per day from exhaling. In the cold, this moisture condenses on the walls, on bedding and on the calf's coat. When the calf's coat gets wet, it stops working as insulation from the cold. A young calf could lose the ability to regulate body heat and could die from cold even when temperatures are above freezing.

High humidity not only causes poor growing conditions for calves, it also makes good growing conditions for disease-causing pathogens. Pathogens can survive for several minutes when breathed out into air with a relative humidity of 75% or greater. This extended timeframe gives pathogens a better chance of spreading from one animal to another.

A calf with respiratory disease can shed millions of organisms from her lungs into the air around her. Those organisms have a harder time surviving when relative humidity is lower than 75%. In many calf housing facilities, the humidity level is such that viruses can live for as long as 40 minutes after exhalation.

When a calf uses energy to battle viruses or bacteria, she can no longer use that energy to grow and mature. This limits her potential, and wastes the quality energy you

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have worked hard to give her in milk replacer and feed.

Noxious gases

- **Calf impact:**

They irritate mucous membranes in the calf's respiratory system, making the calf vulnerable to disease.

- **Ventilation solution:**

When purchasing outdoor hutches, look for systems that have the largest possible ventilation opening, preferably near the top of the back wall of the hutch. Ideally, the ventilation hole would be adjustable to respond to cool, hot, wet or windy weather.

- **Details:**

Like all animals, calves release waste that can become dangerous if allowed to reach high levels. For example, studies have shown that ammonia levels a calf is exposed to during her first four months of life impact her age at first calving. Ammonia at levels of 25 parts per million (ppm) can irritate the respiratory system and reduce a calf's natural protection from disease. Hydrogen sulphide is also highly toxic; levels above 50ppm have been known to kill cattle. The primary source of hydrogen sulphide is agitation to manure pits. Another waste product, carbon dioxide, is not considered poisonous. However at levels above 3,000ppm, it adversely affects cattle because it indicates a reduction in the amount of oxygen present.

Extreme temperatures

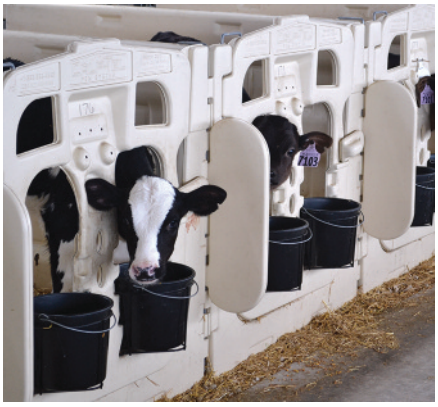
- **Calf impact:**

Increased risk of disease and decreased performance. Dehydration is also a risk, particularly in hot weather. Temperatures above 29°C (85°F) can increase respiration rate and induce sweating, both of which lead to reduced feed intake. On the other hand, if air temperature falls below 10°C (50°F), the calf diverts energy from growth and uses it to maintain body temperature.

Research suggests calves cannot dissipate accumulated heat when daily low temperatures in their housing exceed 25°C (77°F). This can lead to reduced grain intake, which can then lead to slowed rumen development or a drop off of growth rate after weaning. Additionally, calves lose immunity response when they redirect energy to keeping cool.

- **Calf housing solution:**

While quality ventilation should certainly be a goal, ventilation cannot do everything to keep calves comfortable. Many other housing factors can take away the gains you could make with good ventilation or other management activities. For example, in the summertime, the inside of a translucent hutch that is penetrated by the sun will be on average 8°C (15°F) warmer than the inside of an opaque hutch with the same ventilation.



Indoors or out, the best calf housing systems give producers options to adjust ventilation depending on the weather and the calf's needs.

Be proactive

Ventilation touches every aspect of raising dairy cattle. As demonstrated, improper ventilation can have negative impacts on every aspect of a calf program. For example, money spent on feed will be lost when a calf is using energy to fight off disease or is not consuming feed because she is uncomfortable in a stuffy, humid hutch.

Often we see producers waiting to see a problem before fixing it. Consider instead being proactive and making improvements before problems start. You could start by frequently measuring and logging temperatures and relative humidity levels in your calves' hutches or pens. For the best accuracy, get inside hutches or pens to collect data from the space in which the calves live.

Having this information could help you to make adjustments to the ventilation systems in your current calf housing or change the way you are using those systems. It also could help you to choose a new housing system with the ventilation that works best on your farm. Look for calf housing that offers flexibility in ventilation options.

Large, adjustable ventilation openings or removable walls can help provide quality ventilation indoors and out. You cannot control the weather or air condition your entire facility, but you can choose products that help reduce humidity, dust and airborne pathogens to help your healthy calves grow into productive cows. ■

References are available on request from: info@hampelgmbh.com