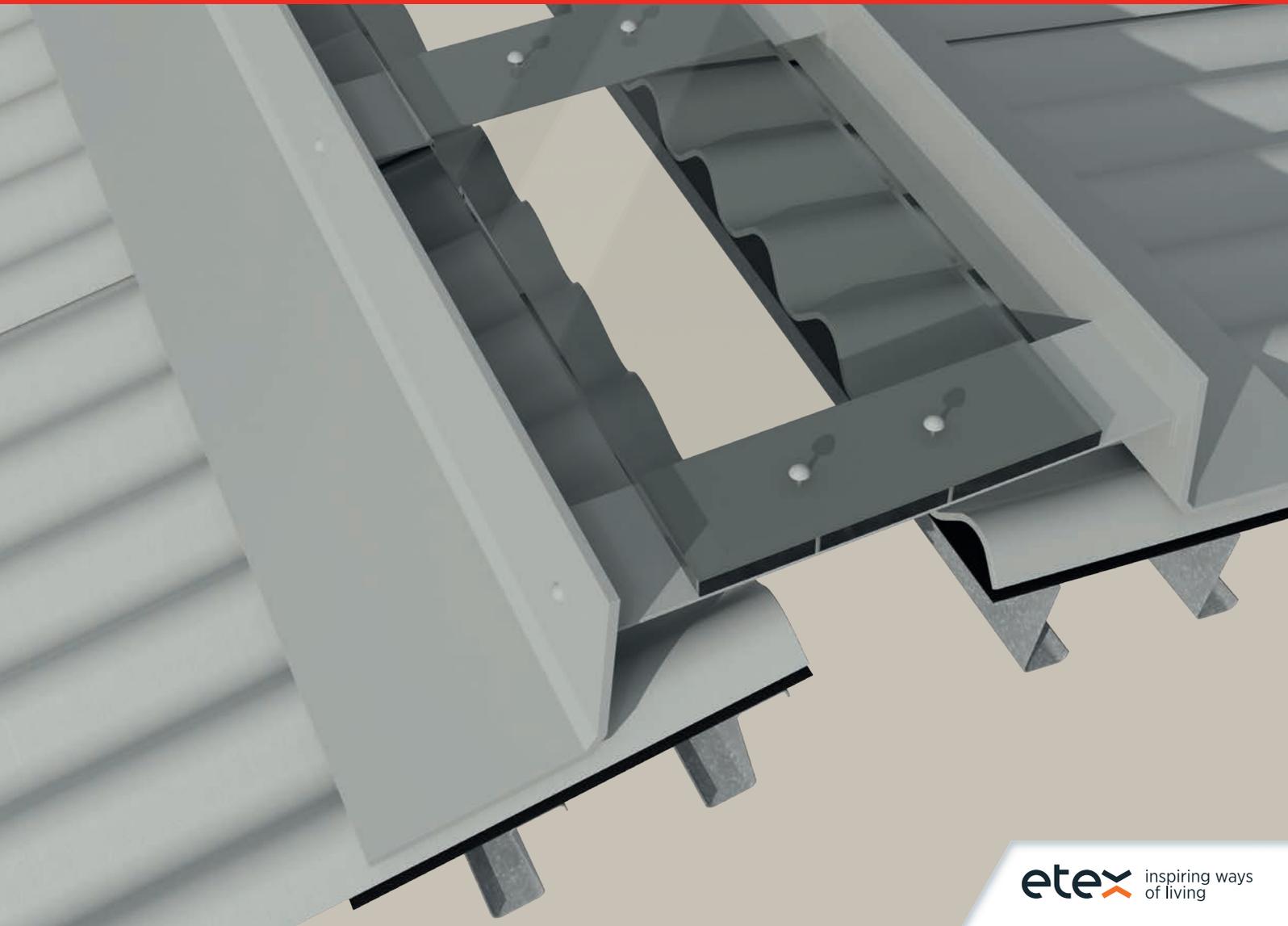


Eternit

Ventilation Guide

Livestock building design & material guide





The internal environment in livestock buildings cannot be ignored

As livestock producers are now targeted to manage antibiotic use by focusing on disease prevention. A well designed livestock building can help you in this task;



Pneumonia causes significantly lower growth rates and increased treatments contributing the greatest costs, shows research from Scarsdale Vets.

“50% of naturally ventilated buildings assessed are not competently ventilated”

Jamie Robertson,
Livestock health specialist and honorary research fellow
at Aberdeen University

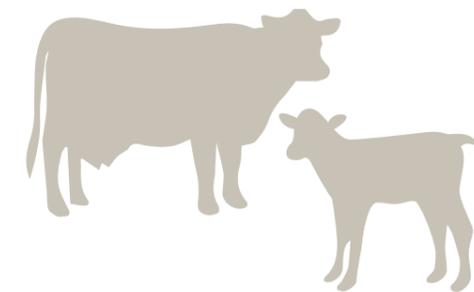
The factors above drive the necessity to maximise production and increase profitability, one thing becomes clear – livestock producers are under immense pressure.

Whether it’s an existing building undergoing refurbishment or a new build, design and materials for improved ventilation and internal shed environments will have a direct impact on animal productivity through the relationship between animal welfare and animal health.

Well planned design is needed for air speed, air inlet and air outlet to work together for adequate ventilation to reduce humidity levels, bacteria and other pollutants which significantly increase the chances of respiratory diseases such as pneumonia.

However, building design is only part of the equation

Building materials also come into play when maintaining a comfortable and healthy internal environment for livestock. And while some popular products may seem like the most economical decision, they can lead to long term costs associated with decreased animal performance, increased veterinary bills.



Poor ventilation causes poor productivity



Poor ventilation



Increased humidity and condensation



Respiratory disease increases, lower feed conversion, higher veterinary bills



Higher levels of bacteria, viruses, causing illness



Uncomfortable animals, decreased production

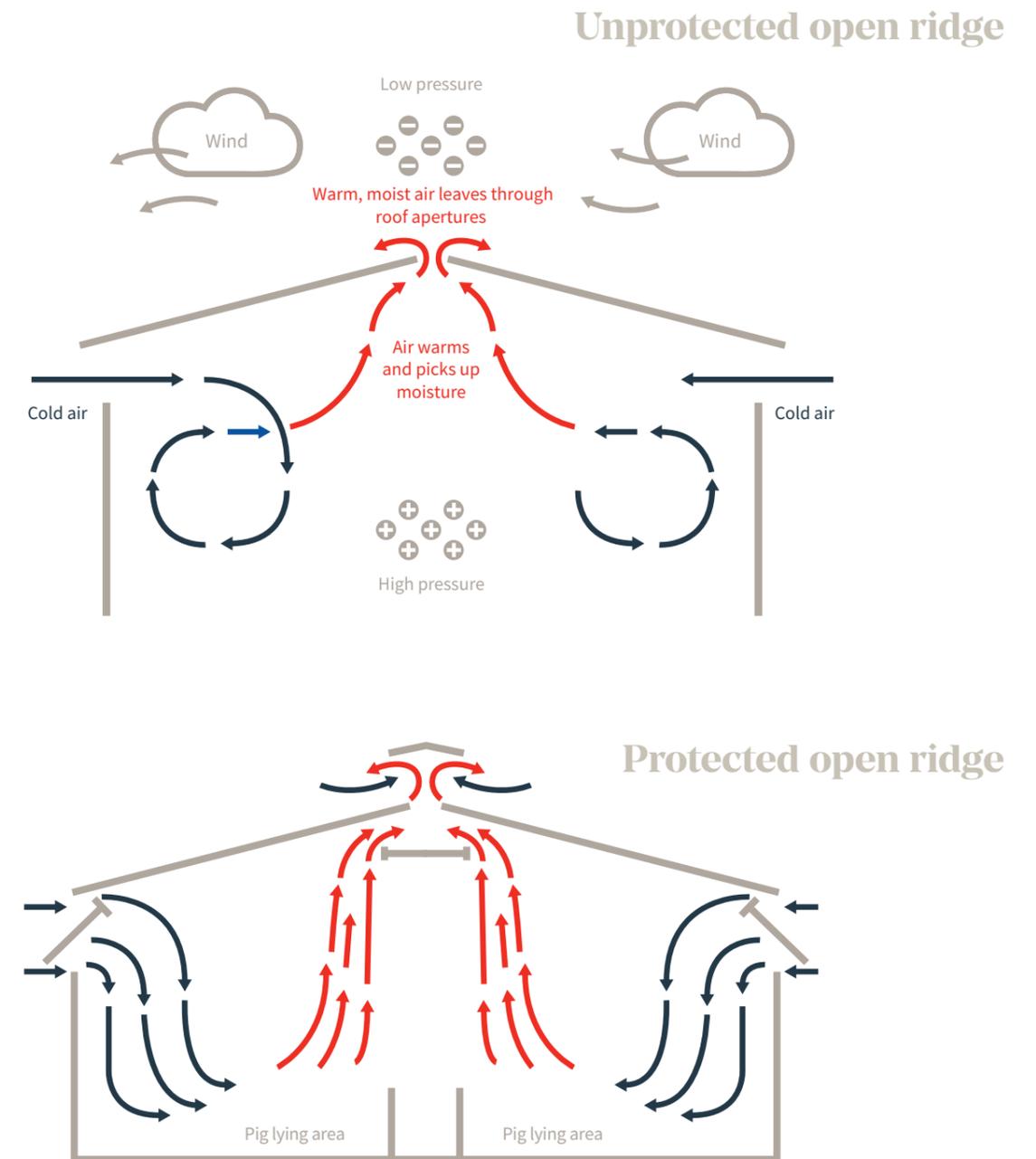


Natural ventilation requires careful planning

Maintaining adequate ventilation comes down to two things: managing wind impact and the physics of the air inlet/air outlet cycle. As livestock expel warm air which may contain bacteria and viruses, it rises to the top of the building – making air inlets essential to support air movement in the absence of wind.

Stack effect ventilation for cattle

The stack effect provides effective and natural ventilation that works through the pressure differentials occurring between the inside and outside of the building.



“Most wind effect designs will operate effectively at a wind speed of 11.2mph and, in the UK, this is available for about 95% of the time.”

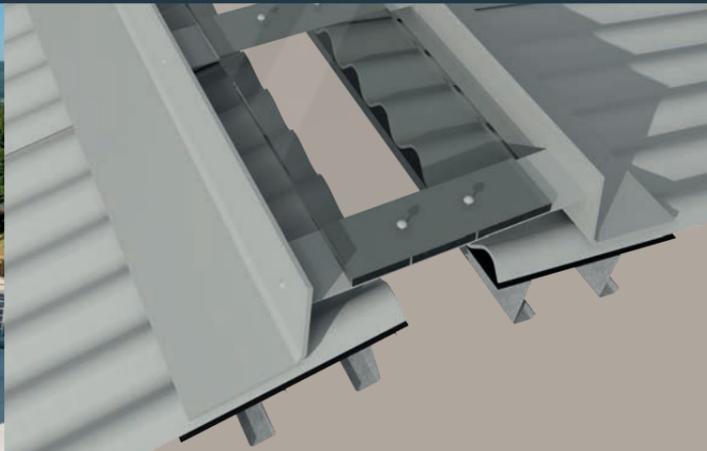
AHDB Controlled Environment for Livestock

i If you require ventilation advice and help on a live build project, simply email us at infouk@etexgroup.com and we will be happy to arrange for your regional specialist to contact you.



Eternit has products to suit any air outlet requirements

For livestock buildings air outlet can be obtained from multiple products and designs including open ridge upstands, spaced roofs and raised sheets. However advice should be sought for calculation purposes. Contact infouk@etexgroup.co.uk to find out more.

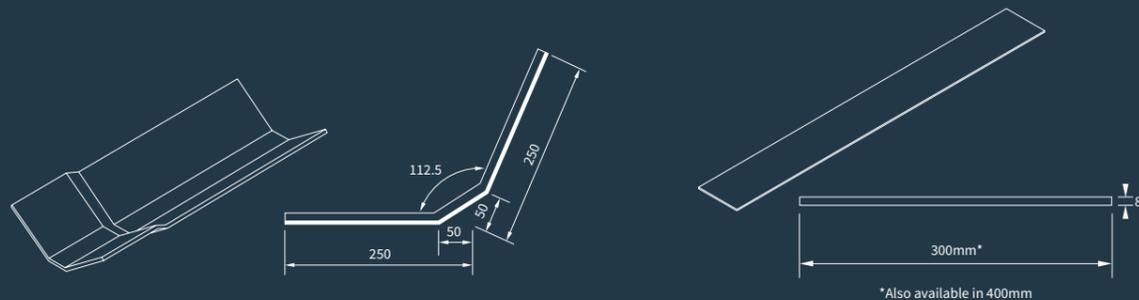


Unprotected open ridges

- Air moves up the slope of the roof and is deflected by the upstand, creating negative pressure at the ridge and enhancing the draw of air through the open vent.

Protected open ridges

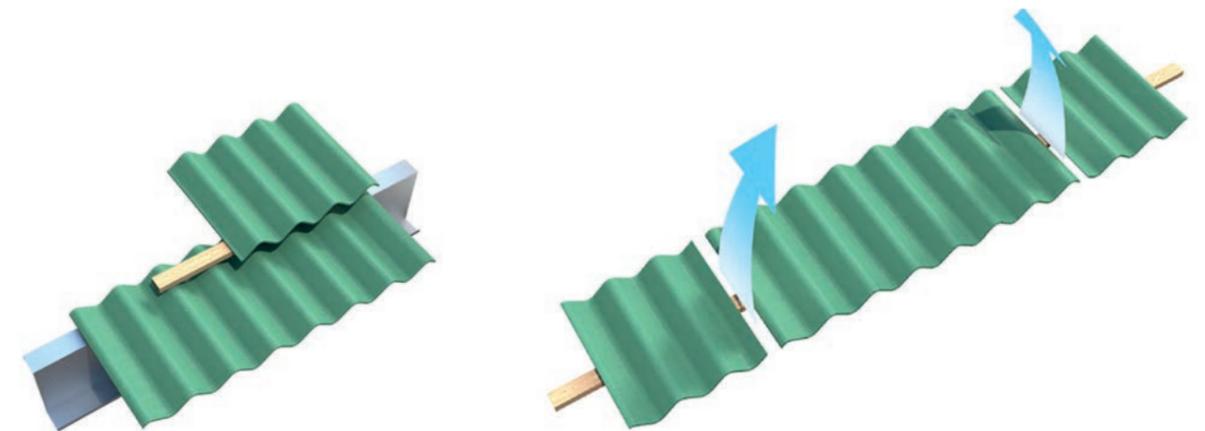
- In addition to the traditional fibre cement soffit strip, a polycarbonate soffit strip is available from Eternit to allow more natural light into buildings while avoiding 'hot spots'.
- Eternit can assist with design advice to obtain optimum air space for livestock while adhering to health and safety guidance.



*Also available in 400mm

Breathing and spaced roofs

While open ridges should be the main method of providing high level ventilation, spaced roofs or breathing roofs can be used in conjunction with open ridges when additional ventilation is required. Not only do these designs decrease condensation, but they also reduce or eliminate mitring of fibre cement sheets where it would normally be required due to overlaps.



Breathing roofs

- Made by inserting a preservative treated 15-25mm timber batten between the profiled sheets at the horizontal overlap of each course
- Small ventilation openings minimise weather penetration
- Reduces condensation on the underside of the roof
- Used in addition with protected open ridges when unable to provide enough high level ventilation for the size and stock level of the building

Spaced roofs*

- Minimise internal condensation levels
- Should be fitted with a space around 10mm between each adjacent sheet
- Best achieved by using Eternit roof sheets trimmed to a width of 1,000mm

* Please note that sheets fixed in this manner will be classed as a fragile roof covering.

“The average 650kg Holstein respire 10 litres of moisture per day, quickly turning a barn into a stagnant, humid environment without an outlet.”

Jamie Robertson, Livestock health specialist and honorary research fellow at Aberdeen University

“For optimum ventilation, roof pitch should be 17° to 22°. It's not uncommon to find buildings with a roof pitch at 12°, which reduces air flow and increases snow load.”

AHDB Better Cattle Housing Design

Air inlets provide constant air flow

Things such as pen walls, partitions and feeders can prohibit air movement in naturally ventilated livestock buildings and must be kept in consideration.

Air inlet for cattle buildings

According to AHDB, design for air inlet should consist of two evenly split sidewalls that are four times the size of the outlet area to maintain air flow throughout the building while reducing airspeed at animal height.

- For example, if a dairy building is 30 metres long and 20 metres wide containing 100 cows, then it needs a minimum of 10m² of hole space to get adequate airflow
- Inlet at gable ends should only be utilised when buildings exceed 25m in width or if inlet areas on the sides of buildings are restricted

For ventilation to work well, you need adequate air inlets too. If the building is enclosed, the inlets need to be big enough to provide a constant flow of air, without being so large that they subject the animals to wind and rain.”

Jamie Robertson, Livestock health specialist and honorary research fellow at Aberdeen University

Dairy Case Study

Improved ventilation allows high yielding dairy cows to remain indoors all year round

Good ventilation and buying British were the key reasons for choosing spaced roof sheets from Eternit for a new dairy unit in West Dorset.

The decision was made to invest in the farm, owned by the Cooper Dean Estate family partnership, near Beaminster. The buildings on the farm had not been invested in since the 1970s so plans were drawn up for a new cubicle house, collecting yard, feed passage and straw yard, increasing cow numbers from 150 to 300.

The proposed site for the new building was to be dug into the hill behind the existing unit, minimizing the visual impact. Farmscape Anthracite was chosen for the roof of the unit as the dark colour perfectly matched the roofs of the existing farm buildings adjacent to the new development.

“As well as being ‘down in a hole’ the site is also exposed to the prevailing wind from the South West, so getting enough fresh air in, whilst keeping the prevailing wind and rain out of the new build was something we spent a lot of time on” said Ed Bowditch who runs the farm.

To address the ventilation concerns, local Agricultural Frame Manufacturer PH Hardwill Ltd., designed the building with spaced timber boarding on the wind-facing end and side, with the side where the building faces the embankment left fully open. To ensure enough air circulation, the trimmed Eternit Farmscape sheets were installed with a 16mm gap and the building incorporated a protected open ridge to draw the stale air out of the building. The sheets nearest the eaves at either side of the building were left untrimmed to ensure that the air entering the building from either side flows over the cattle rather than exiting straight up and through the roof. **“I’m really pleased with the design” says Ed. “The heat rising from the cows actually prevents the moisture entering through the gaps. Our high yielders are inside all year round and last summer these sheds were the coolest place on the farm.”**

When planning the project, another consideration for Ed was sourcing British products wherever possible.

“When PH Hardwill Ltd. recommended Eternit sheets I was happy to take their advice. They have a good reputation in the industry for producing high quality products and are a British company as well. We definitely made the right choice. The buildings work well and look right, most importantly our cows are content and performing well in their new environment.”



Airspeed

Energy loss from livestock due to draughts can reduce feed conversion and immunity suppression, potentially leading to higher disease rates, says AHDB's Better Cattle Housing Design guide.

Adult cattle are most resilient to airspeed, however youngstock's low immunity and pigs not being ruminants, make them most sensitive.

- When wind speed rises from 0 to 15mph (6.8m/s) energy loss doubles
- 0.5m/s draught for youngstock
- 0.15m/s draught for pigs

Instead of sealing off walls, livestock producers should use cladding or windbreak material which act as precipitation barriers while allowing adequate movement for ventilation. While there are many options available on the market, there are many considerations outlined by AHDB.

Cladding options

- Yorkshire boarding (150mm board with 20-50mm gap)
- Spaced boarding (100-150mm board with 20-25mm gap)
- Perforated metal sheeting
- Plastic or woven ventilation curtains

“The optimum temperature for a dairy cow is around 5°C, so this is critical to maximise production and welfare in the building. The cooler the cow, the more she lays down, and the more milk she will produce.”

Ivor Davey, CowPlan Dairy Housing and Design Consultant



If you require ventilation advice and help on a live build project, simply email us at infouk@etexgroup.com and we will be happy to arrange for your regional specialist to contact you.

Roofing materials make a difference

When selecting roofing material for livestock buildings, the overall production picture needs to be looked at with a focus of maintaining a stable building environment rather than choosing the cheapest option.

Metal Sheet disadvantages

For example it has several downsides that can end up costing livestock producers more long-term in production.

- Noise levels in hail or heavy rain on metal sheeting are much higher than fibre cement, significantly increasing cow discomfort which leads to a reduction in productivity
- High thermal conductivity creates opportunity for rapid temperature swings within buildings, putting livestock at greatest risk
- Contributes to high humidity levels due to the inability to absorb moisture, leading to increased condensation levels from warm, humid air coming into contact with the cool underside roof finish. Humid environments foster bacteria

“Tin is the least appropriate material for animal house roofing because it increases the risk of condensation compared with most other roofing materials. Condensation is moisture that would have left the building if the ventilation specification and the roof materials were more appropriate.”

AHDB Better Cattle Housing Design



Eternit fibre cement sheeting advantages

Eternit semi-compressed profiled sheeting carries the greatest benefits in improving livestock productivity by contributing to animal welfare conditions. It can also outlast metal sheeting upwards of 25 years.

- Design life of at least 50 years
- Absorbs sound, reducing noise reverberation
- Low (0.4) thermal conductivity prevents temperature swings while creating mild internal building environment year-round

- Eternit's semi-compressed sheets are lighter sheets to install than fully compressed sheets and have the best absorbency rate of any fibre cement sheet in the UK at 25% of its own weight. This minimises condensation beyond the ability of any other sheet in the market whether it is metal or fibre

Metal sheet ('tin roofing') properties



High levels of condensation and eventually, water droplets to fall onto livestock

High levels of sound transmission from rain drum

High thermal conductivity, transfers temperatures

Fibre cement properties



Able to absorb moisture, so minimises condensation

Able to absorb sound, so minimises internal noise

Lower thermal conductivity, so retains some heat



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All previous issues here within lapse, with this edition.

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