Calf house ventilation:
The basics

In association with
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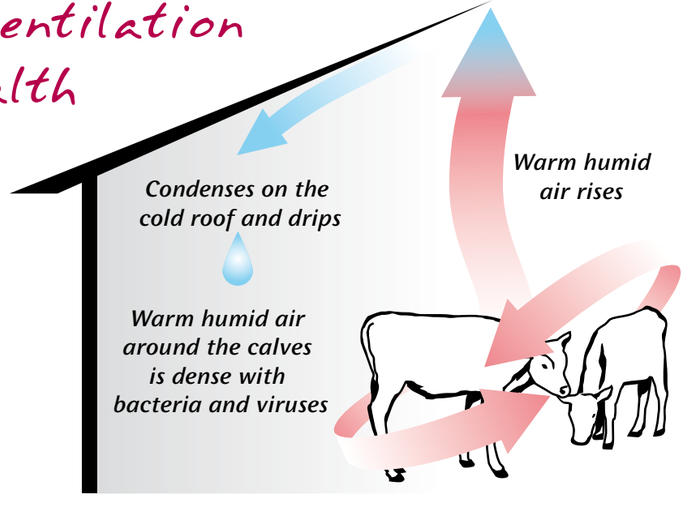
BOVILIS Bovipast® RSP

MSD Animal Health

Good housing and ventilation is vital for calf health

Poor ventilation in livestock housing leads to dampness and condensation – this presents a serious health risk to your stock. In particular, calves are at risk from airborne moisture and also from wet bedding and pools of water.



The science bit

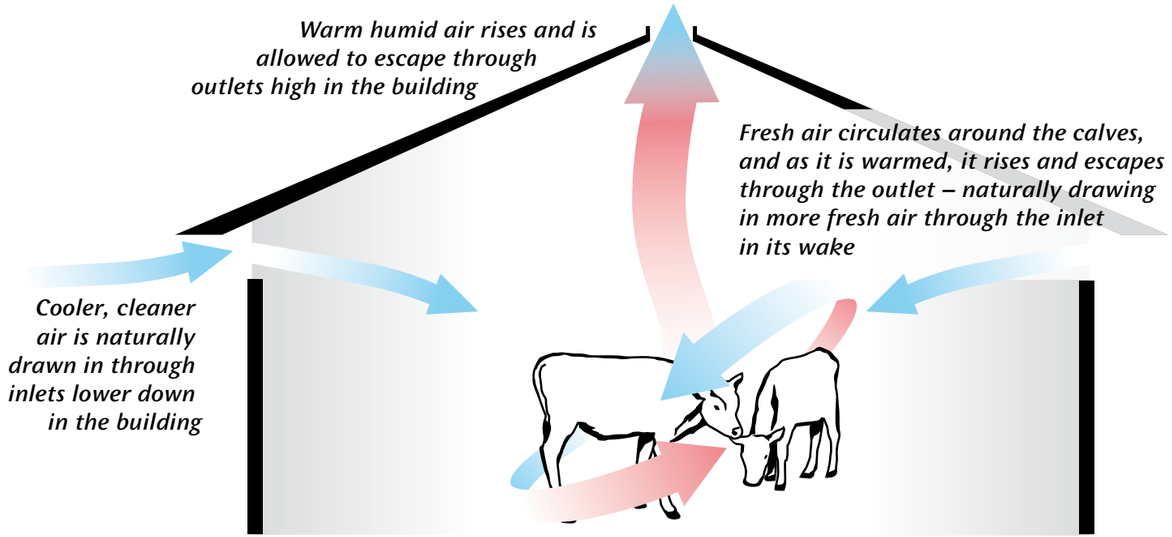
Within the air that we all breathe, there is a quantity of water present as vapour. Depending on the conditions, there may be more or less moisture content in the air (humidity).

Livestock give off a huge amount of heat from their bodies, they also expel large amounts of moisture in their breath. In the warm air around their bodies much of the moisture can be held in the air, however as the warm (humid) air rises and cools, the water can no longer be held and begins to condense out as tiny droplets. When the air hits the cold roof, the water condenses on the inside of the surface and drips down to form wet pools.

Humid air is not, in itself, a problem. The problem comes in the fact that warm wet air makes an excellent environment for infectious organisms to float around – potentially spreading problems from calf to calf.

Good ventilation simply exploits what happens naturally

Armed with the knowledge that warm humid air rises above the bodies of livestock and that fresh air (with far fewer bugs) can help prevent the spread of infection; it becomes simple to define an effective ventilation system powered by nothing more than body heat from the animals and the laws of physics!



Surely it can't be that simple?

Well yes. And no.

The principles are very simple; however, there are a few basic rules that need to be followed in order that the amount of air circulating within the building is sufficient for the number of animals that are housed. Without these rules, it is possible that too much (or worse too little) air is allowed to circulate – which can lead to problems.

The ground rules...

1. **The outlet needs to be big enough to let the air out (see later for how to work this out) and should be at the high point of the building – usually the ridge of the roof.**
2. Pitched roof good, flat roof bad. The difference in height between the outlet at the top of the building and the inlet lower down will determine how well air circulates. Generally the more pitched a roof, the better. Flat roofs have no height difference and don't create the right airflow.
3. Inlets should be lower down in the building than the outlet and are ideal if they allow fresh air to be drawn in above the level of the calves (cooler air sinks so it won't just fly over the calves and out the roof).
4. Never try and control the temperature of your calf house by restricting ventilation- this is a big mistake almost guaranteed to lead to trouble.

The maths bit

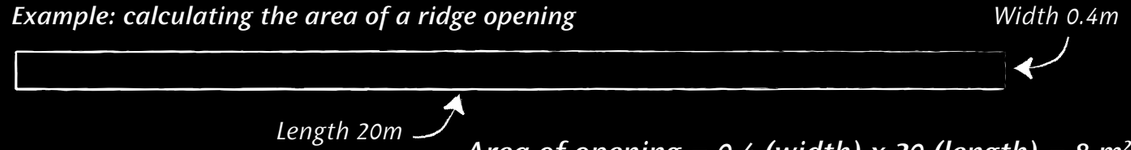
By following some rules of thumb, and making a few calculations, a building's ventilation can be made ideal for the appropriate size and number of animals which will be housed.

Calculating areas

Area: the amount of flat space covered by whatever you are measuring

Area (in metres squared or m²) = width (m) x length (m)

Example: calculating the area of a ridge opening



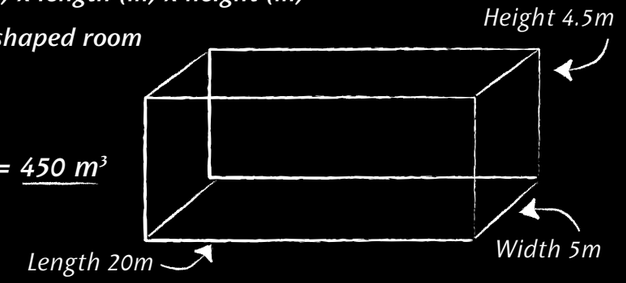
Area of opening = 0.4 (width) x 20 (length) = 8 m²

Calculating volumes

Volume: the amount of 3 dimensional space you are measuring

Volume (in metres cubed or m³) = width (m) x length (m) x height (m)

Example: calculating the volume of a box shaped room



Volume of building =
5 (width) x 20 (length) x 4.5 (height) = 450 m³

BUT WHAT IF:

the building's got a pitched roof – how do you calculate the volume of that?

Volume of a pitched roof calf house

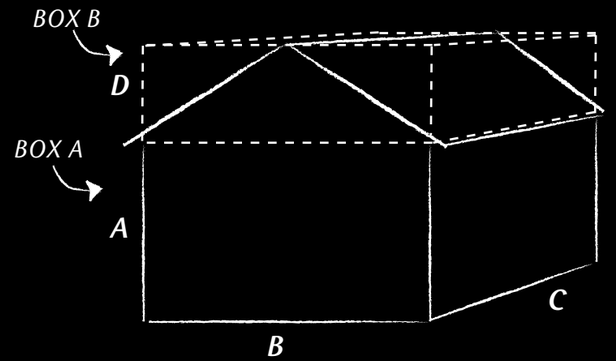
Many buildings will have pitched roofs and so a simple 'box' type calculation of volume is not appropriate. Now there are mathematical formulae for working out the volume of the space under a triangle (like a pitched roof) but, frankly, it is easier to CHEAT.

Once you have made the measurements opposite, calculate the volume of the rectangular BOX A: width ***B*** (m) x length ***C*** (m) x height ***A*** (m) (from floor to bottom of pitched roof) = volume ***X*** (m^3).

Second, calculate the volume of dotted BOX B: width ***B*** (m) x length ***C*** (m) x height ***D*** (m) (difference between the bottom and the apex of pitched roof) = volume ***Y*** (m^3). Then DIVIDE THIS VOLUME BY 2 to generate the correct volume of the pitched roof section of the building = volume ***Z*** (m^3).

Add the volumes of the 2 boxes together (***X*** + ***Z***) to give the volume of the whole building.

Calculating volume



1. *Measure height of walls to start of roof pitch (A)*
2. *Measure width of building (B)*
3. *Measure length of building (C)*
4. *Measure height from top of wall to apex of roof (D)*
   NB if access is an issue, try counting rows of bricks or numbers of slats to estimate height

DON'T CLIMB ON THE ROOF!

How can I tell whether the ventilation is right for my livestock?

First, you have to check that there is enough airspace for each of the animals housed in the shed. Typically, the following minimum amount of airspace should be allowed:

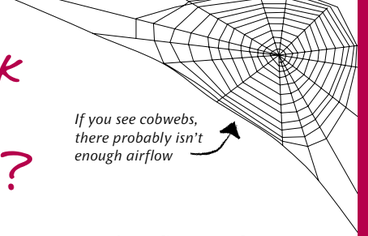
SIZE OF ANIMAL	MINIMUM AIRSPACE
Calf up to 90kg	$10m^3$ each
90-150kg	$13m^3$ each
150kg plus	$15m^3$ each

Secondly, you need to check that the outlet at the top of the building is sufficiently large. Typically, the rule of thumb is to allow:

$0.05m^2$ opening per calf (or $5m^2$ per 100 calves)
$0.08m^2$ opening per older beef animal (or $8m^2$ per 100 animals)
$0.1m^2$ opening per large animal like a big dairy cow (or $10m^2$ per 100 cows)

In addition, it is useful to check that your ridge opening is correct for the width of your building. You should allow 50mm of ridge opening for every 3m of building width (so a building 21 metres wide would have a ridge opening of about 350mm).

How do I check the airflow in my building?



Smoke tests are ideal for observing the flow of air around a shed. Smoke pellets are available from plumbers' merchants. Place the pellets on a non-flammable dish low down in the building in a couple of locations, light the pellets and observe the smoke moving through the building. Look out for areas where the smoke collects as these are 'dead spots' where the ventilation is not effective.

Protection from pneumonia is not just about good ventilation

Although it is important to ensure ventilation is adequate to prevent calf pneumonia, there are many stress factors that can increase the likelihood of pneumonia occurring.

Your vet will be able to advise you about good practice for pneumonia prevention. In addition, using a vaccine such as Bovipast RSP can help protect against some of the most common causes of pneumonia.

Speak to your vet today about ventilation and make sure you discuss the advantages of vaccinating with Bovilis Bovipast RSP.

For further information please contact our customer support line: Ireland and Northern Ireland: (+353) 1 2970220 or email: vet-support.ie@merck.com

Bovilis Bovipast RSP contains inactivated bovine Respiratory Syncytial Virus (strain EV908), Parainfluenza 3 virus (strain SF-4 Reisinger) and inactivated *Mannheimia (Pasteurella) haemolytica* (serotype A1) for the active immunisation of cattle against RSV, Pi3 virus and *M. haemolytica.* Withdrawal period: Zero days.

Further information is available. Bovilis Bovipast RSP is sold by your veterinary surgeon or pharmacist, from whom advice should be sought. **Legal category:** POM-E POM-V (NI)

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