

How to protect

Attention to ventilation is key if housed cattle are to thrive

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Last month, MSD Ireland asked Jamie Robertson, a ventilation expert from the University of Aberdeen, Scotland, to facilitate a discussion with a group of farmers and advisors on a farm visit in Co Westmeath. Jamie started by challenging farmers to identify the amount of money on their farms associated with animal deaths, lack of thrive, medicines and vet fees and then consider how much of this would have been better spent on building improvements to offset some of the problems.

Jamie is passionate about having proper ventilation in a building to maximise animal health and live-weight gain. He stated that problems in farm buildings are usually due to an imbalance in one or more of three separate factors – moisture, fresh air and air speed. See Table 1.

He explained that by correcting these three environmental factors in your sheds, you can remove airborne pathogens and other harmful bacteria. He said that targeting a reduction in moisture and providing 100% fresh air (without drafts) in sheds applies to all categories of stock to maximise liveweight gain no matter what system you are in.

He went on to explain to farmers that when animals are grouped in a shed, they produce heat. This heat rises and when it hits the roof, it can either be released through an outlet in the roof or, if no outlet is available, it will cool down and come back down over the animals again.

The air flowing back on to the animals will almost certainly carry harmful bugs and has been proven to cause ill-health and respiratory problems. As the heat from the animals rises, it is replaced by 100% fresh air. This is known as the “stack effect”. Jamie made the point that most farmers should check how well their sheds are ventilated when cattle are



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in them, on a calm day, with no wind outside.

Jamie pointed out that the shed has to work in all types of weather as animals will always expel heat and this warm, bug-filled air has to get away through an outlet to be replaced by fresh air. He made a very interesting point in relation to the stack effect and young calves. He said that “calves cannot produce enough energy/heat to drive the stack effect.” In every calf-rearing house, mechanical fans are needed to extract the air to the outlet.

Jamie explained that it is tempting to dismiss a building as “overstocked” and that this is the main contributor to animal health problems on farms.

A slope of at least 17 degrees and a good outlet are vital to allow heat generated by adult cattle to rise and disperse.

your farm assets



Table 1

Factor	Condition	Contribution	Symptoms
Moisture	Too much	<ul style="list-style-type: none"> • Supports microbial activity • Promotes bacterial growth (some species) • Absorbs energy • Acts as a transport medium • Increases slippery floors - stress 	<ul style="list-style-type: none"> • Dirty water lying • Dirty cattle • Damp floors in areas that could be dry • Water ingress • Leaking drinkers • Condensation • Staining of underside of roof • Animal health
Fresh air	Too little	<ul style="list-style-type: none"> • Lack of fresh air increases survival time of airborne pathogens • Lack of fresh air increases concentration of gaseous emissions. • Lack of fresh air can reduce oxygen concentrations 	<ul style="list-style-type: none"> • Smell – ammonia, dampness • Dark corners – no light no ventilation • Elevated air temperatures • Animal health
Air speed	Too much	<ul style="list-style-type: none"> • Too much: associated with excessive energy losses 	<ul style="list-style-type: none"> • Animals avoiding certain areas • Huddling • Hairy coat • High intake/ low production rates • Animal health
	Too little	<ul style="list-style-type: none"> • Too little: associated with lack of fresh air 	<ul style="list-style-type: none"> • Animals avoiding certain areas • Smell • Animal health

Lower critical temperature (LCT): the lowest temperature an animal can be exposed to before they change metabolically to help them cope with cold stress. Upper critical temperature (UCT): the highest temperature an animal can be exposed to before they change metabolically to help them cope with heat stress.

Table 2

Factor	Interaction/ from	Notes	Solutions
Moisture	Bugs	Respiratory pathogens. Mastitis: E.Coli, Strep. uberis	• Drainage. One in 60, or one in 20 below straw.
	Faeces/urine	25-45 l/day	• Drainage within pen, between pens, within building, outside.
	Respiration	Up to 10 l/day	• Manure management.
	Rainfall	At 6m ² /cow, 100 cow space has 600m ² of roof. 1000mm (39inches) rain per annum = 600 t/annum	• Straw management. • Air inlets and outlets. • Decent gutters and downpipes. • Considerate concrete.
Fresh air	Kills bugs	100% fresh air kills airborne bugs 10 times quicker than 50% fresh air	Air inlets and outlets
Air speed	Comfort zone LCT/UCT	Four-week-old healthy calf LCT = 0°C.	Air inlets and outlets:
	Need for air movement	0.2m to 0.5m/s	• Protection from wind to above animal height.
	Wind chill	At 2m/s air speed, LCT of healthy four-week-old calf is +9°C.	• Greater use of perforated wall cladding.
	Young animal needs High yielders	LCT of sick animal Massive heat loss needed.	• Elimination of draughts at animal height.

“This false logic is perpetuated if a problem diminishes when the number of stock in a building is reduced. In reality, this is an expensive solution as it ignores the physical causes of the original problem, be it poor drainage, poor ventilation or a lack of control of air speed.”

He went on to explain that for every environmental factor affecting the building that a solution can be found. These solutions are summarised in Table 2: “100% fresh air kills airborne bugs 10 times quicker than 50% fresh air.” Jamie explained that having correct air inlets and outlets on farm buildings is paramount in providing a healthy environment for livestock to thrive. He said every farmer should

carry out the following simple assessment of his farm buildings.

- Assess the roof first. No outlets means a guaranteed contribution to problems.
- Area of opening (outlet) in roof.
 - Ballpark outlet areas at the ridge: 0.04m² per calf and 0.1m² per adult. Seldom less than 200mm wide open ridge for adult and growing cattle.
 - Depends primarily on slope of roof. A flat roof is bad: a slope of at least 17 degrees is good.
- Area of inlet: at least twice or, preferably, four times the area of outlet.
- Design of inlet:
 - Always look to eliminate draughts at animal height.
 - Large openings do not control

air speed, they increase them. Large openings that may create stress at animal level should be replaced with space boarding, Yorkshire boarding or weaved mesh-type products (wind break) to control air speed.

• Inlet and outlet areas are best as a series of diffuse openings along the ridge and walls; less risk of stagnant areas within the building.

Jamie clearly made an impact with his straight-talking and visible passion for animal health to the many farmers present, with one farmer saying: “I have to go home now and let off some hot air.”

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Tom Coll and Mickey Nicholls.

Case study

Michael (Mickey) Nicholls farms a suckler to weanling enterprise near Mohill, Co Leitrim. Pneumonia in weanlings after housing in October and in young spring-born calves prior to turnout has been a major ongoing problem on the farm. Respiratory disease of cattle leads to increased veterinary costs and reduced animal performance.

Mickey identified that the slatted house was the main contributing factor to the disease outbreaks and decided to take steps to alleviate the problem. The existing slatted shed originally consisted of a five-bay single shed, which was converted in 1988 to a five-bay double shed with a central passage and cubicles at the back of the slatted area on eight of the 10 bays. The main deficiencies identified in the shed were:

- Eave height of 2.3m with a 10-degree

Table 3: Original shed v converted shed

	Original shed	Converted shed
Eave height	2.3m	3.3m
Ridge height	4m	5.7m
Roof slope	10 degrees	15 degrees
Inlet area	9m ²	25m ²
Outlet area	5.6m ²	13.5m ²
Airspace	1,036m ²	1,658m ²

slope in the roof.

- Inadequate inlet with walls built to top of stanchion.
- Inadequate airspace per animal housed.
- Inadequate outlet.
- Evidence of poor airflow, stuffy smell, cobwebs, dust and dirt on the roof and end sheeting.

All roof sheeting was removed, numbered and reused on the building. The eave height and ridge heights in-

creased by 1m and 1.7m, respectively, resulting in the roof pitch changing from a 10-degree to a 15-degree slope.

The inlet now consists of 1.3m of Yorkshire boarding. Boards are 100mm in width with 75mm openings and 50mm between the outer and inner boarding. This resulted in an increase in inlet area from 9m² in the original shed to 25m² after conversion.

The outlet ridge in the roof has also been widened from 250mm in the original shed to 600mm, changing the outlet area from 5.6m² to 13.5m².

The overall shed conversion increased airspace by 160% from 1,036m² to 1,658m².

Mickey is confident that the changes in shed design will improve air movement within the shed, resulting in the removal of airborne pathogens and a significant reduction in future respiratory disease outbreaks.