SEAL UP THOSE BARNS

Infiltration of air through unintentional air leaks or gaps in the structure reduces the amount of fresh air entering through air inlets, reducing the effectiveness of the ventilation system. Infiltration affects the desired operating static pressure at minimum ventilation, which negatively affects fresh-air distribution in the building. Infiltration originates from improperly sealed back-draft shutters and from building shell sources such as ceiling panel joints and the interface between walls and the ceiling. Wall-to-ceiling joints are best controlled with foam insulation in the attic, but this is an expensive option. On the other hand, significant improvement in minimum ventilation performance can be achieved by sealing unused fans, which can be achieved with interior plastic sheeting. Winter sealing of all unused fans is a cost-effective measure that can significantly reduce the negative impact from excessive infiltration.

Ensure there is a good vapour barrier in walls and ceilings, as moisture within the barn will lead to condensation accumulation and structural deterioration. An improperly placed vapour barrier can reduce the insulation value, leading to heating concerns. Install a 6 mm polyethylene film, vapour barrier on the warm side of the insulation.

Energy conservation is a good reason to consider high levels of insulation. Insulation will reduce fuel requirements in terms of heating in cold weather and minimize solar gain/temperature rise in warm weather. Well insulated buildings are easier and cheaper to ventilate, is a good rule of thumb.

Insulation in the attic

BARN INSULATION

- Condensation or wetness on the interior side of walls in a barn indicates an insulation problem. Inspect walls and attics for insulation deterioration due to water and/or rodents.
- For exterior walls of a feeder barn, insulate to a level of RSI 3.5 (R20) and for the ceiling: 5.25 (R30) to 7.0 (R40). Do you have sufficient insulation in your barn? Using a ruler, it is possible to remove a panel on the wall or in the attic and determine the R/RSI values using Table 9.
- When installing insulation, it can be feasible to exceed the recommended R-value by 25% depending on climate. Beyond these values however, extra insulation provides only marginal savings in heating costs due to the high proportion of heat lost through the ventilation system.
- Do not overlook the foundation, this can be a high percentage of total building heat losses. To decrease this loss, use a small strip of polystyrene providing an insulation value of RSI 1.2 or R7.

Table 9. RSI value of four insulation types.

Depth of material	Rockwool		Fiberglass bats		Fiberglass blown		Polyurethane	
	R value	RSI	R value	RSI	R value	RSI	R value	RSI
1″	2.5	0.44	3.5	0.62	2.7	0.47	5.9	1.04
2″	5.0	0.88	7.0	1.24	5.4	0.94	11.8	2.08
3″	7.5	1.32	10.5	1.86	8.1	1.41	17.7	3.12
4″	10	1.76	14.0	2.48	10.8	1.88	23.6	4.16
5″	15	2.64	21.0	3.72	16.2	2082	35.4	6.24
6″	17.5	3.08	24.5	4.34	18.9	3.29	41.3	7.28
7″	20.0	3.52	28.0	4.96	21.6	3.76	47.2	8.32

What's the cost?

Consider again our 200-head grower-finish room. Let's use the same conditions outlined in the controller example:

- room filled with 60 kg pigs:
- outside temperature –19°C with a 60% RH
- inside temperature 18°C with a 70% RH
- minimum ventilation rate 568 L/sec

The room has an insulation value of RSI 3.35 mineral fibre in the walls and RSI 4.44 in the ceiling. Recall that under optimum conditions, the room costs $3.06/day or $94.95 for the month of January to heat. Over time a building will lose insulation value due to water and rodent damage. How does this affect heat loss from the room and more importantly does it impact heating costs?

- If 50% of the insulation value is lost, 1195 W of heat is lost. This room will now cost **$3.95/day** or **$122.52/month** to heat, based again on a $0.031/kWh natural gas price.
- If 30% of the insulation value is lost, 717 W of heat is lost. 17% more heat would have to be added for a total cost of **$3.60/day** or **$111.49/month**.