

Managing Minimum Ventilation

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When it gets cold outside, a poultry house needs a much lower ventilation rate than in warm weather. The need for ventilation, however, never goes away completely, even when there is no need to remove excess heat from the house, and even in the coldest weather. We must always provide at least some *minimum rate* of the *right kind* of ventilation to provide fresh air and oxygen to the birds, and to exhaust ammonia, carbon dioxide and moisture from the house.

Too much moisture is the most common cold-weather problem in poultry houses, bringing wet litter and ammonia build-up that can be very costly in terms of bird performance, bird health, even bird survival. Ventilation is the only practical way to prevent this problem, by bringing in outside air and exhausting moisture-laden in-house air. And we need to do this even when outside air is very cold and even wet, and there is no need to get rid of excess bird heat.

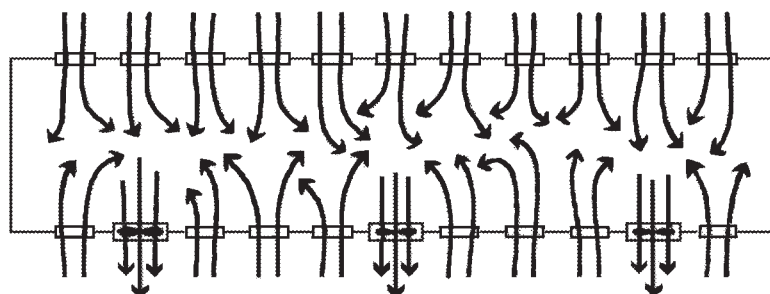
The amount of house heat lost during proper *minimum ventilation* is insignificant compared with the benefits gained in bird performance. And, since the relative humidity of air depends on its temperature – a 20-degree rise in temperature cuts relative humidity in half – we don't have to worry about moisture coming into the house with outside air. Cold air can't hold that much moisture to start with, and as it is warmed by mixing with house air its relative humidity will drop. This enables the ventilation air flow through the house to absorb and exhaust excess moisture. Thus we can – and must – operate minimum ventilation even when an all-day cold rain is falling outside.

Unlike warm-weather ventilation, which is typically operated on thermostats, low-level minimum ventilation is normally timer driven. For young birds, the timer setting may be as little as one minute in every ten. As birds grow larger, they generate more and more heat, so that eventually – especially if outside temperature is not too low – it will be necessary for thermostats to override timer fans to exhaust excess house heat. Typically in cold weather, however, minimum ventilation is cycled on and off even when the thermostat doesn't call for ventilation, and even when a small amount of excess heat must be removed it will be done at a very low rate.

The critical factor for successful minimum ventilation is making sure that incoming cold air mixes uniformly with and is warmed by in-house air before coming in contact with the birds. The setup that most consistently meets this requirement is a negative-pressure system using sidewall exhaust fans with adjustable-board sidewall air inlets. A plan view of this system shows the air flow pattern created, as seen from above. The partial vacuum created in the house (static pressure usually between 0.05 and 0.10 inches), pulls air in evenly and at the same high velocity

through all inlets, so that the mixing of outside and in-house air is uniform throughout the house.

The type of air inlet used can make a big difference to bird comfort and performance in cold weather ventilation. Negative-pressure minimum ventilation systems can use either curtain cracks, fixed board cracks, or adjustable lou-



In cold weather, ventilation is essential to prevent moisture problems

Minimum ventilation is needed even when there is no need to get rid of excess heat

Key to success is keeping cold outside air from flowing directly over and chilling birds

Negative-pressure system with adjustable-board inlets creates best air flow pattern for minimum ventilation

comfort and performance in cold weather ventilation. Negative-pressure minimum ventilation systems can use either curtain cracks, fixed board cracks, or adjustable lou-

The type of inlet and how it is operated is the major tool to prevent bird chilling

A cracked curtain inlet directs cold air downward, with little warming before contacting birds

A fixed board inlet directs incoming air more on a level trajectory

A properly adjusted louver board inlet directs cold air toward ceiling, avoids bird chilling

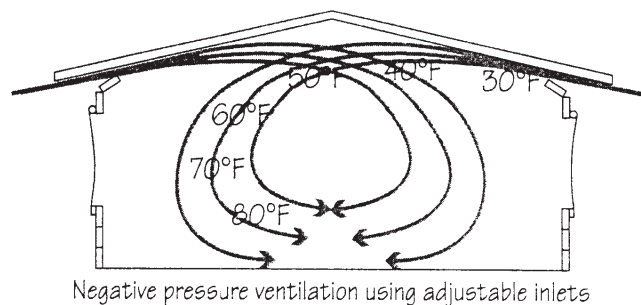
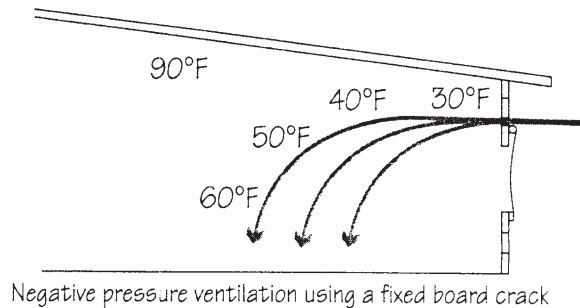
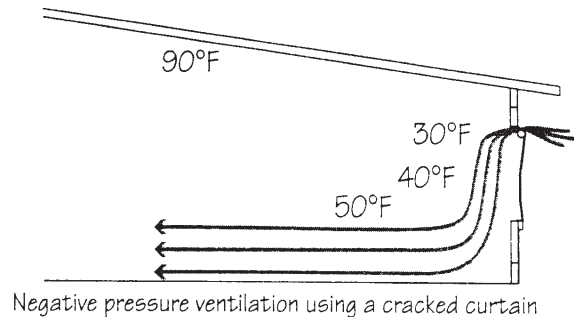
Minimum ventilation for maximum cold-weather bird performance

ver-type board air inlets. The adjustable board type is best because it directs the incoming airflow upward toward the ceiling. When the board is positioned properly and static pressure is maintained, the high-velocity incoming air thus shoots along the ceiling to the center of the house to mix with house air well above bird level, so there is little chance of chilling or wetting the birds. A fixed board crack tends to deliver air more on a level, so the cold air has less time to mix and be warmed. The curtain crack setup is least effective because its physical arrangement directs incoming air downward toward the birds.

The exact air exchange rate needed depends primarily on the age of the birds. As they grow larger and put out more moisture and heat, system on-time needs to be increased. In-house relative humidity and litter moisture, along with bird behavior, serve as guides in setting the minimum ventilation rate. Normally, meeting the birds' fresh air and oxygen requirements, along with preventing ammonia build-up, will be

taken care of if ventilation is operated to control relative humidity below about 70%. Thus, a good relative humidity meter is essential for monitoring in-house conditions and making the right ventilation decisions.

As with any negative-pressure ventilation system, successful minimum ventilation requires a tight house. What is needed is high velocity air flow coming in through high sidewall inlets. Any air leaks will tend to defeat this, and result in chilling the birds. Also, inlets must be adjusted for the right static pressure. If openings are too small, static pressure will go too high and the fans will not be able to deliver their rated air flow or enough air volume. If the inlet area is too large, static pressure will drop, resulting in lower air velocity and a less uniform air flow pattern.



To summarize: Even when there is no need to remove heat from the house, some *minimum* rate of ventilation must be maintained. Keys to success are having the right fan and air inlet setup and operating the system to:

1. Provide adequate air exchange to control moisture, and
2. Provide an in-house air flow pattern that avoids chilling the birds.

A properly set up and managed minimum ventilation system helps a grower get maximum cold-weather bird performance.