Aviagen Turkeys

Technical Bulletin

A technical publication from Aviagen Turkeys - USA Issue 12

Tighten Houses to Control Propane Use

By Garrett L. Van Wicklen, Applied Poultry Engineering in Seaford, Delaware

Would you leave the front door to your dwelling house wide open all winter? With high energy prices no one would even consider that. So how can anyone expect to be profitable doing that very same thing in their poultry houses? While no grower would intentionally leave doors open in cold weather, there could be an equivalent area open to the outdoors in the form of small holes and cracks over the entire heated house envelope. It doesn't look as bad as an open door, but just as much heat is lost.

Propane prices in the mid 1990's were roughly 40 to 50 cents per gallon. Since that time prices have approached $1.85 per gallon and fallen as low as $1.20 per gallon, so gambling on low prices is not a safe bet. Years ago, energy didn't cost enough to justify the investment in solid, insulated side walls, extensive attic insulation, or to even worry about tight curtains. Those days are over.

A house with lots of air leakage is termed "loose", while a house with a sealed envelope is known as "tight". Growers must have tight poultry housing for profitable production. Fuel conservation is one important advantage of tight housing, but without tight housing a grower has little control over where ventilation air enters a house in winter as well as summer. As the percentage of solid side wall houses increases, it will become clear that tight housing allows a grower to direct ventilation air where it can do the most good instead of bringing air into a house through randomly located cracks.

As poultry houses age, insulation settles, holes develop in curtains and ceilings, cracks occur as wood shrinks and twists, and foundations settle. It has always been a challenge to seal curtains and the gap between the lower sill (plate) and the foundation.

The purpose of this article is to relate how older housing can be tightened with a relatively low cost investment and some grower "sweat equity."

Testing for Tightness

One of the best methods of teaching is by example. To educate poultry growers on Delmarva, an extremely loose house was identified through the help of the live production department of a poultry company. A tightness test was the first thing done to measure the looseness of the house. During a layout, all doors, curtains and vent boxes were totally closed. Two, 36-inch side wall fans were operated and the static pressure between indoor and outdoor air was measured as 0.03 inches water column.

A wide open house would have a static pressure close to zero. For an older house to have satisfactory tightness a static pressure of 0.13 inches water column should be measured. A newly constructed tight house should have a pressure test measuring a minimum of 0.20 inches water column. From these values, our example house would be characterized as "very loose".

Buying Supplies

To improve the tightness of the example house, our first stop was a "big box" home improvement store to purchase some supplies. Two dozen cans of polyurethane spray foam insulation were selected to help seal house cracks. Rolls of polystyrene (styrofoam) rope and flat material were acquired to fill gaps around doors and along the foundation. A 100 foot roll of polyethylene plastic (6-mil thickness) was chosen to cover the tunnel curtain opening from inside the house during the winter. Although the house had a tunnel curtain, it had holes and would not seal tightly. The final bill for these materials was about $250.

Identifying and Correcting Air Leaks

A primary area for air leakage is around the end and side wall doors. Framing around side doors often shrinks as it dries creating gaps that can be filled with spray foam. It's easy to see cracks and holes in the building envelope by entering the house and turning off all lights on a sunny day. All of the holes and cracks are evident where sunlight enters the house.

Sealing end doors tight begins by cleaning litter away that might prevent doors from sealing against adjacent end walls. To help seal these doors tighter, polystyrene tape was applied around the perimeter of the door, ***see photo 1***.

Photo 1: Install polystyrene tape weather-stripping around the perimeter of end doors to improve their seal.

Older houses (and even some newer houses) leak air between the top of the foundation and the lower sill plate, ***see photo 2***. To check for leakage, turn on some fans and generate smoke outside near the foundation while another person watches for smoke inside the house, ***see photo 3***. Cold air entering at this point will blow directly onto young birds and cause wet litter resulting ammonia generation.

At our example house, the gap between the foundation and plate was filled with spray foam from outside the house in combination with the polystyrene rope style weather-stripping material, ***see photos 4 and 5***. Using any type of foam material to seal gaps might only be a temporary fix without adequate darkling beetle control. Beetles love to eat foam insulation. Caulk or tar may prove to be a more durable product in this case.

Photo 2: The gap between the top of the foundation and lower plate is a source of cold air leakage on birds and litter.

Photo 3: Generate smoke outside the house near the top of the foundation to see how much leaks into the house.

Photo 4: Spray foam being applied to fill the gap between the plate and top of the foundation.

Photo 5: Polystyrene rope and tape can be used to seal air from entering between the wall metal and the foundation.

The final work of our first day of house tightening was to staple polyethylene across the tunnel opening. Although it was stapled securely around the perimeter of the tunnel opening, this covering would be removed at the end of the heating season.

Results from Sealing Air Leaks

A pressure test was done to check the improvement following our day's work. After sealing some of the building's leakage the pressure test measured 0.08 inches water column. While still on the low side of satisfactory, the house was significantly tighter than it was initially.

Four hours of work the next morning were devoted to sealing more leaks. Additional cans (20) of spray foam were purchased. At the conclusion of the morning's effort, another pressure test indicated 0.11 inches wc. According to calculations by Mike Czarick, poultry engineer at the University of Georgia, our efforts had reduced the air leakage area from 20 square feet to less than 10 square feet!

Additional Basic Maintenance

Beyond filling gaps in walls and ceilings, remember some basic maintenance work that can help tighten a house. Install bonnets or "shower caps" on fans that won't likely be used. Even if these fans do operate, many bonnets are designed to blow off (and you can have fun chasing them). Plastic sheets can be applied temporarily behind many interior fan shutters or across fan openings inside the house.

Fan shutters need to be cleaned each flock so that they move freely and fully close when the fan isn't operating. If you have panels on fan shutters that are broken, replace them, ***see photo 6***. That hole in the fan opening will cost you much more in gas than the shutter panel.

Photo 6: Replace broken fan shutter panels. Don't' leave a permanent hole for cold air to enter the house

With more expensive propane on the horizon, it won't take long to pay for the investment in supplies needed to fill leakage area in a house. If you want to stay within your fuel allowance, it's time to take some action and tighten your houses. A tight house is one of the best things you can do to improve your bottom line.

Garrett Van Wicklen is a consulting engineer, specializing in poultry house energy, heating and ventilation. He formerly served on the faculty at the University of Georgia and the University of Delaware.

Aviagen Turkeys, Inc.
31186 Midland Trail, East • Lewisburg, West Virginia 24901• USA
Tel: +1 304 793 2680 • Fax: +1 304 793 2684
turkeysinc@aviagen.com

Aviagen Turkeys Ltd
Chowley Five, Chowley Oak Business Park • Tattenhall, Cheshire CH3 9GA • UK
Tel: +44 (0) 1829 772020 • Fax: +44 (0) 1829 772059
turkeysltd@aviagen.com

Web: www.aviagen.com