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Poultry Housing Tips

The Importance of House Tightness During Hot Weather

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Figure 1. Cracks in top of side wall

Most producers have learned over the years that the key to keeping heating costs and drafts to a minimum during cold weather is having a tight house. Time spent on tightening side wall curtains and patching cracks in the side wall, and holes in the ceilings can make it much easier to maintain proper house temperatures on cold winter nights without spending a small fortune on propane. Tightening a house also insures that more of the fresh air brought into the house by timer fans will enter through side wall inlets and is thereby directed along the ceiling reducing temperature stratification as well as minimizing drafts on the birds. How well a side wall inlet house operates during cold weather depends very heavily on how tight it is.

But, did you know that house tightness is very important to producers with tunnel-ventilated houses during hot weather, especially for those with evaporative cooling pads? During cold weather air that enters through side wall inlets helps to keep the birds warm and the air fresh. But, during hot weather all the air should enter through the evaporative cooling pads in order to achieve maximum cooling. The problem is that hot outside air entering through cracks in the side wall and ceiling dilutes the cold air entering through the pads before it can make to birds at the fan end of the house. So when a house is loose you could end up with a situation where the fan end of the house instead of being just a few degrees warmer than the pad end of the house, is six degrees or more warmer than the air at the pad end of the house.

Figure 2. Side wall with sealed cracks

House tightness is significantly more important in houses with pads than in tunnel-ventilated houses with fogging nozzles for a couple of reasons. First, in a house with fogging nozzles the cooling of the air continues as the air moves toward the fan end of the house because fogging nozzles are located throughout the house. So, if a little hot air enters through cracks in the middle of the house it still can be cooled because there are fogging nozzles in that area of the house. This of course not the case in houses with evaporative cooling pads where little or no cooling takes place after the air passes through the pads. Another reason why tightness is so important to houses with evaporative cooling pads is that it is about three to four times easier for the exhaust fans to pull air through cracks in the house than it is through the evaporative cooling pad. Therefore, the exhaust fans will pull three to four times more air through the cracks in a house with evaporative cooling pads than through the same cracks in a tunnel-ventilated house which uses fogging nozzles for cooling.

A study was conducted this summer on a farm with two 40' X 400' open ceiling, tunnel-ventilated houses equipped with two inch fogging pads to see what effect house tightness has on bird cooling. The farm was selected based on the fact that both houses were very loose and the producer had difficulty in properly ventilating the houses in the past. The amount of leakage was estimated by conducting a static pressure test. The side wall and tunnel inlets were closed, then one 48" fan was turned on and the static pressure was measured. The static pressure created by the one 48" fan was found to be approximately 0.03" in both houses, indicating that there was well over 20 square feet of leakage (see *Poultry Housing Tips: Reducing Broiler House Heating Costs*, January 1997). The houses were then examined and the primary sources of the leakage were determined to be gaps around the boards in between the trusses on the side wall (Figure 1) and cracks along the ridge of the house (The house was equipped with curtain flaps so there was essentially no air leaking between the curtains and the side wall (see *Poultry Housing Tips: Reducing Side Wall Curtain Leakage*, December 1996)).

The area between the trusses at the top of the side walls as well as the ridge were sealed in one of the houses with approximately a two foot swath of 1 ½ inch commercially applied Polyurethane foam sealant (Figures 2). The foam did an excellent job of tightening the house as demonstrated by the fact that the static pressure increased to 0.18" with one 48" fan operating. Leakage was estimated to be reduced from in excess of 20 square feet to less than five square feet.

Temperature recorders were placed approximately 40' from the tunnel fan end wall in each of the houses when birds were placed in July to determine what effect the Polyurethane foam sealant had on producer's ability to keep his birds cool during hot weather. Air temperatures were recorded every 10 minutes over the entire grow out.

As can be seen in Figure 3 the fan end of the house sealed with the Polyurethane foam was consistently cooler than the fan end of the house which was not sealed. The magnitude of the difference depended on outside temperature. On mild days, when the outside temperature was in the low nineties, the air temperature at the fan end of the sealed house was only about one degree cooler than the same location in the unsealed house. But on days when the outside temperature was in the high nineties, when the need for cooling was at its greatest, the difference in air temperature

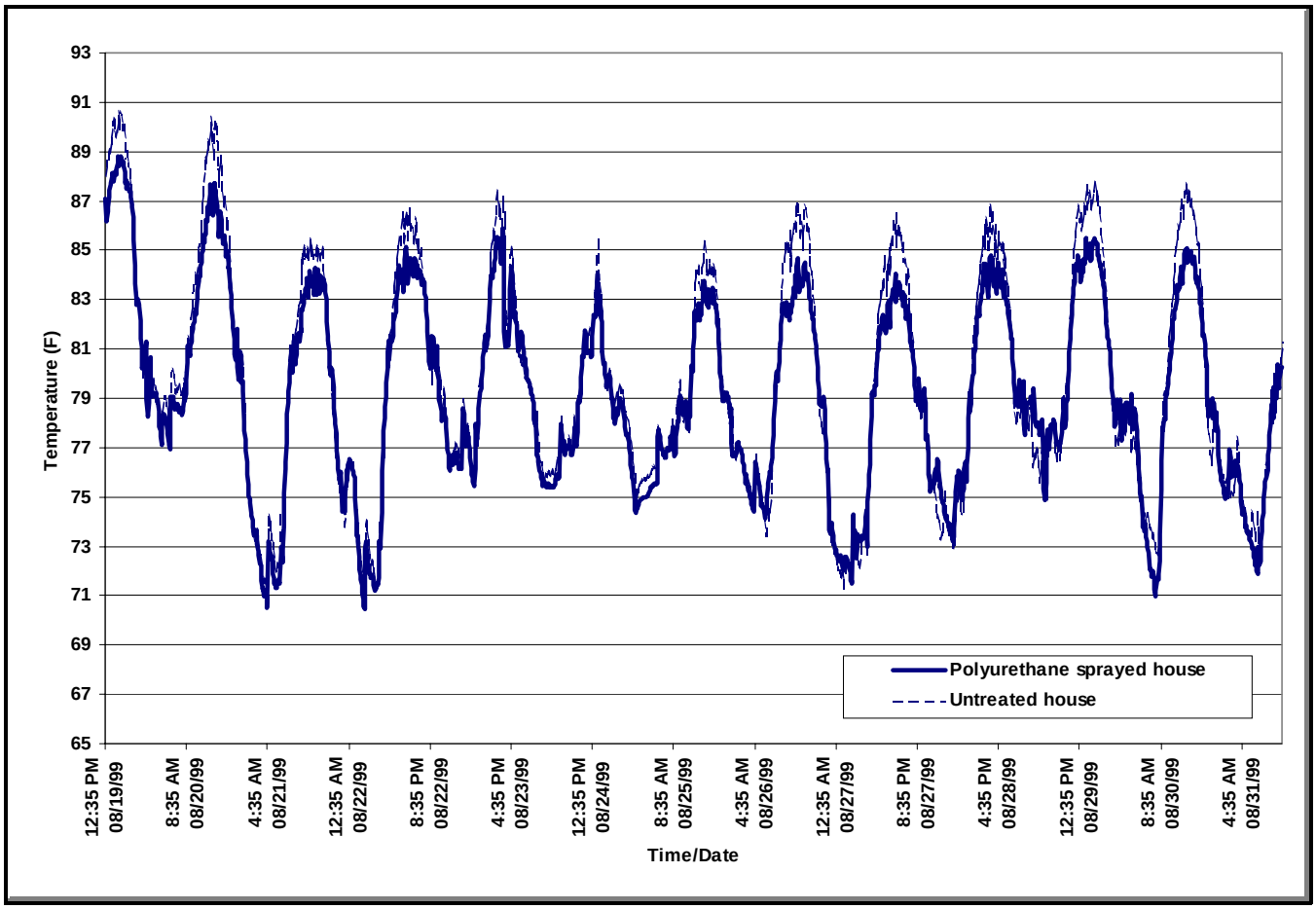

Figure 3. Air temperatures at fan end of the houses

at the fan end of the houses was as much as three degrees. As a result, where there was about a four degree difference in air temperature between the pad and inlet ends of the house which was sealed with Polyurethane foam, there was as much as a eight degree difference in the temperature between the pad and inlet ends of the house which was not sprayed.

This of course a fairly extreme example of loose house, but it does illustrate the importance of keeping a tunnel ventilated house with evaporative cooling pads tight when it is hot outside. By tightening your curtains and sealing cracks in your houses (and don't forget your side wall inlets), you may not see a three degree difference, but a couple of degrees is likely if your houses are not as tight as they should be.

The owner of this farm is of course anxious to seal the other house on the farm with the spray Polyurethane foam but is willing to wait a few months so we can determine how much fuel he is going to save during the winter months by increasing house tightness. We will let you know what we find out in a future newsletter.

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