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Poultry Housing Tips

Attic Inlets...A First Look

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Figure 1. Counter-weighted attic inlet

A modern broiler house has two very different inlet systems: traditional side wall inlets and tunnel inlets. The tunnel inlets of course are for use during hot weather when we are trying to cool our birds, while the side wall inlets are for the remainder of the year when we are in general trying to conserve bird heat. The question is, do we need a third inlet system? The fact is that the 50 to 100 inlets the typical house has are best suited for mild weather with large birds. If we really wanted air inlets just for use with our timer fans during cold weather, there would be significantly fewer of them. The reduced number of inlets would not only be easier to manage, but because they would tend to open more when the minimum ventilation fans came on, they would do a better job of throwing air towards the center of the house, thus creating more uniform house conditions. Today, many producers create their own "third inlet system" by closing a half or more of their side wall inlets during cold weather. But, is there a better way? One promising possibility is the use of an attic inlet system specifically designed to meet the challenges of ventilating during cold weather.



Figure 2. Various attic types of attic inlets

PUTTING KNOWLEDGE TO WORK

There are a number of advantages of pulling air from an attic instead of directly from outside. First, and most importantly, a house's attic space is significantly warmer than it is outside for a significant portion of the day. Secondly, an attic inlet is less affected by winds than traditional side wall inlets. Third, an attic inlet is generally installed to introduce cold, fresh air into the hottest location in a house, namely at the ceiling, in the center of the house.

Figure 3. Attic inlets in a turkey brooder house.

It is important to realize that there can be disadvantages to an attic inlet system. During the summer, pulling hot air from a house's attic can quickly heat a house to well above 90ºF, causing a modern house to switch to tunnel ventilation when it is still relatively cool outside. When this happens a house can tend to cycle back and forth between inlet and tunnel ventilation. Another problem is that in order to get large volumes of air through the attic required during more mild times of the year openings into the attic space need to be relatively large. Not only does this decrease the ability to store hot air during the cooler times of the year, but it can also make it easier for the wind to enter the attic, leading to introduction of snow and rain into the attic space as well as causing ceiling insulation to shift. Last but not least, attic inlets tend to be more expensive to purchase and install than traditional side wall inlets.

As you can see, many of the potential problems traditionally associated with an attic inlet system tend to occur during the warmer times of the year when we are primarily trying to control house temperature, not air quality. When attic inlets are used during cold weather there are few problems if any. Much like when tunnel inlets are used during hot weather there are few problems. We run into problems when we try to make an inlet system do what it wasn't designed to do (i.e., using tunnel inlets to keep our birds warm, or attic inlets to remove heat from the house).

What kind of attic inlet system would be appropriate for a broiler house? It needs to be able to supply enough air to meet the needs of a house's minimum ventilation fans. It should introduce air at the peak of the ceiling, must be able to be easily closed during hot weather, and should be relatively inexpensive to purchase and install. One type of attic inlet that meets all these criteria is a counter-weighted attic inlet (Figure 1). Counter-weighted attic inlets have been used successfully in hog houses for many years, as well as a few commercial layer houses and pullet houses.

Figure 4. Counter-weighted attic inlet open and locked closed.

The typical counter-weighted attic inlet pulls air through roughly a 24" X 24" opening into the attic space. The air enters the house through four counter-weighted doors that throw air along the ceiling in four different directions. The counter-weighted attic inlet only opens when there is a static pressure greater than 0.05" and closes when the fans shut off. Since opening and closing are due to the static pressure generated by the timer fans an inlet machine is not required. The doors can be kept closed by simply pulling down an upper flap that when opened helps to direct the air along the ceiling (Figure 4). The inlets cost approximately $50 and have a maximum air capacity of around 2,000 cfm.

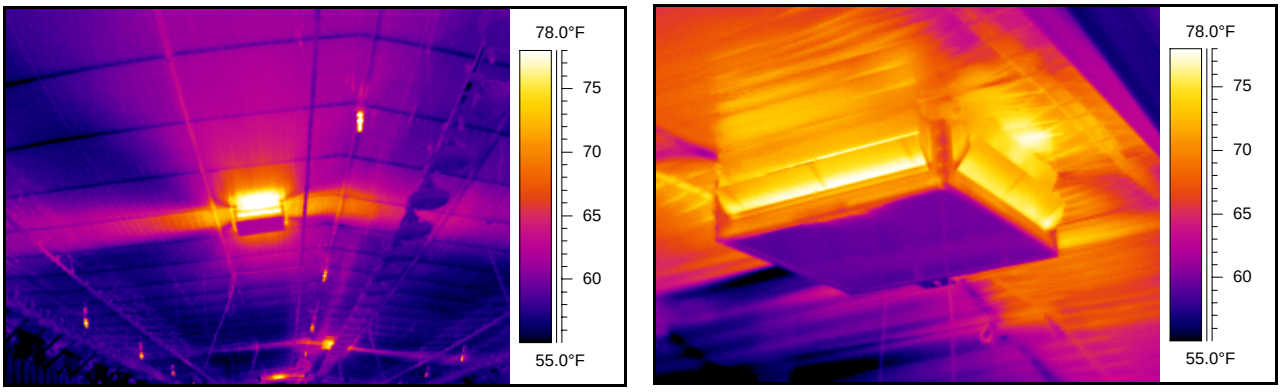

Figure 5. Attic inlet being used between flocks when outside temperature was in the mid fifties.

Presently, University of Georgia extension engineers and poultry scientists are conducting studies on three broiler farms using counter-weighted attic inlets for minimum ventilation. Two houses are 50' X 560' and one is a 40' X 500'. All three study houses are totally enclosed. One of the 50' X 560' houses has 13 inlets, while the other has 16. The 40' X 500' was equipped with 11 inlets. The attic inlets are capable of supplying enough air to operate three to four 36" fans in the 50' wide houses and three 36" fans in the 40' wide house. When a couple of fans are operating the static pressure tends to be around 0.06" (inlets open an inch or two). When three or four fans are on, the static pressure increases to around 0.10" and the attic inlets open fully. When more fans come on, the static pressure rises above 0.10" and the inlet machine opens the side wall inlets to maintain the proper static pressure. The attic inlets remain fully opened when the side wall inlets open.

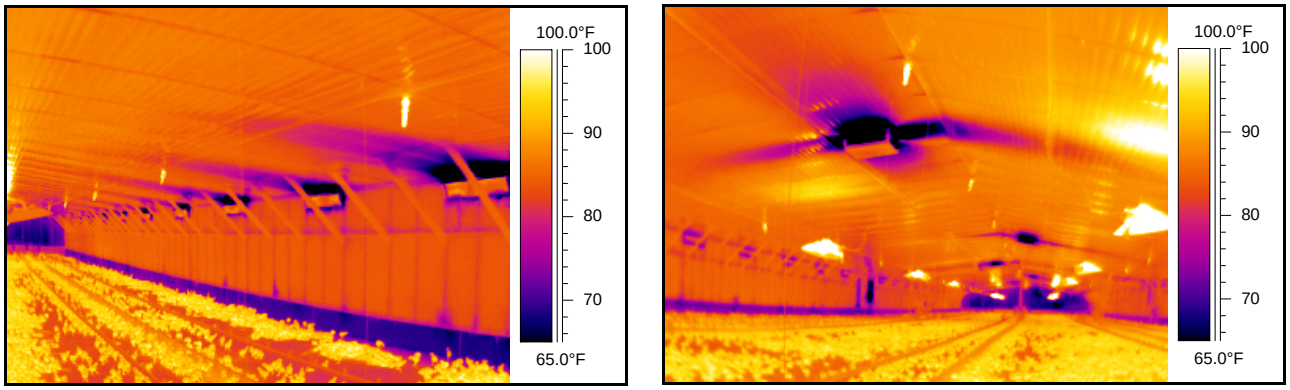

Figure 6. Side by side 50' wide houses. One ventilated using side wall inlets, the other attic inlets.

The counter-weighted attic inlets have produced very favorable results in all the houses studied. The following is a brief summary of our findings to date. More detailed analysis of our findings will be the subject of future Poultry Housing Tips.

1) Daytime attic temperatures are between 5°F and 25°F warmer than outside air temperatures (Figure 7).
2) During the day, fan runtimes are significantly higher in the test houses with counter-weighted ceiling inlets than in the control houses using traditional side wall inlets. The higher daytime ventilation rates have lead to significantly lower daytime relative humidity and drier litter (Figure 8).
3) Lower ammonia levels.

4) Between flocks when attic inlets were used for ventilation house temperature was 10ºF warmer than in the house using side wall inlets (Figure 5).
5) Less drafty conditions in houses using attic inlets when timer fans are operating.
6) Essentially no light enters the house through the attic inlets.

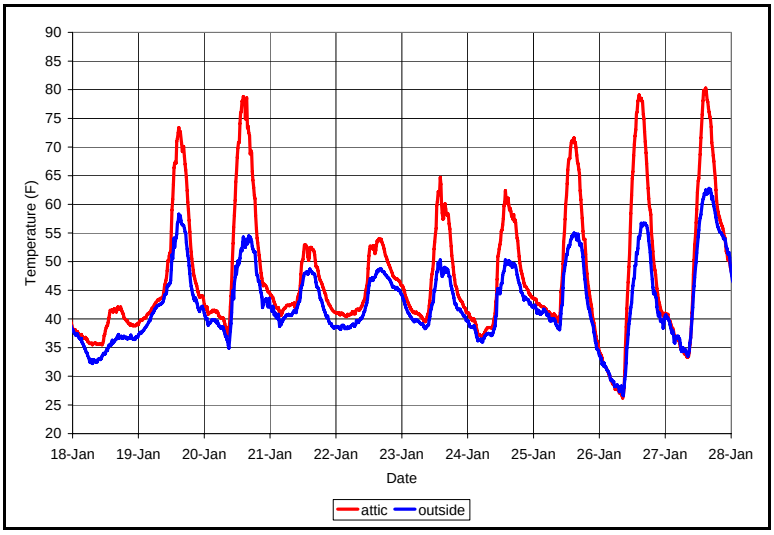

Figure 7. Outside and attic air temperatures in a 50' wide house using counter-weighted attic inlets.

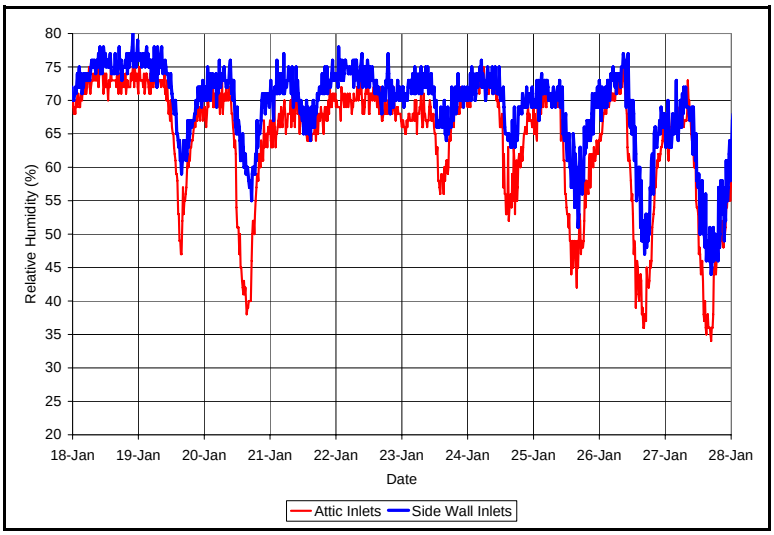

Figure 8. Inside relative humidity in side by side houses.

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