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Poultry Housing Tips

Are You Getting the Most Out of Your Attic Inlet System?

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Though attic inlets can potentially reduce poultry house fuel usage, perhaps the most significant advantage to their use is improved house air quality and litter conditions during cold weather. First, since attic temperatures during the day can be 20°F or higher than outside air temperature, the relative humidity of the air entering a house through a house's attic space can be half as much as that entering through its side wall inlets thereby making it easier to remove house moisture. Secondly, warmer daytime attic temperatures tend to result in higher ventilation rates. The warmer air entering through an attic inlet doesn't tend to cool off the house as quickly as cooler outside air entering through a house's side wall inlet and as a result exhaust fans tend to operate for longer periods of time during the day. Since we are using air to transport the moisture from inside the house to outside the house, the greater the volume of air you can move through a house during the day, the more moisture you will remove from the house, the better your litter and air quality will be.

The typical counter-weighted attic inlet system is sized to operate with between two and four 36" minimum ventilation/timer fans. When the timer fans come on, the attic inlets open and when they shut off they close. As the temperature begins to rise (older birds and/or warmer days) additional fans may turn on. Since the attic inlets are designed to provide enough opening for just a few exhaust fans, the static pressure will tend to increase when more than the minimum number of fans are operating. At this point, the side wall inlets begin to open to provide enough supplemental inlet opening to keep the static pressure from becoming excessive. During this initial cooling stage there tends to be a blending of warmer attic air with cooler outside air (i.e, 50% attic air with 50% outside air) which slightly lessens the warming effect produced by the attic inlets. Later on during the flock or on even warmer days even more exhaust fans may turn on as house temperature increases. The additional fans will result in the side wall inlets opening even further which in turn tends to reduce the warming effect of the attic inlets due to the fact that the capacity of the side wall inlets is far greater than that of the attic inlets (i.e, 20% attic air with 80% outside air). The fact that the attic inlets remain open whenever the house is in side wall inlet mode tends to maximize the amount of air moving through a house which tends to lead to drier litter and improved air quality.

In contrast to this, a number of machine actuated attic inlet systems are basically used in an either/or fashion. That is a house's environmental controller uses either the attic inlet or side wall inlets, not both at the same time. Though this may not seem like a significant difference, the fact of the matter is that an either/or attic inlet system tends to be less effective in removing moisture than one in which both the attic and side wall inlets can operate at the same time.

Recently a study was conducted comparing a four-way machine actuated attic inlet system to a four-way counter weighted attic inlet system. One house on the farm was equipped with 14 counter-weighted attic inlets while a second was equipped with an equal number of machine actuated attic inlets of roughly the same air moving capacity. The attic inlets in both houses had sufficient capacity so that three 36" fans could be operated through them without the static pressure becoming excessive (greater than 0.12"). If additional fans came on due to temperature, in the house with counter-weighted attic inlets, the side wall inlets would begin to open to supplement the attic inlets. In the house with the machine actuated inlets the house's environmental controller would close the attic inlets and begin to utilize the house's side wall inlets. With younger birds and on colder days there was little difference between the two systems. As the birds got older and/or daytime temperatures rose (40°F+) differences between the two systems became increasingly apparent.

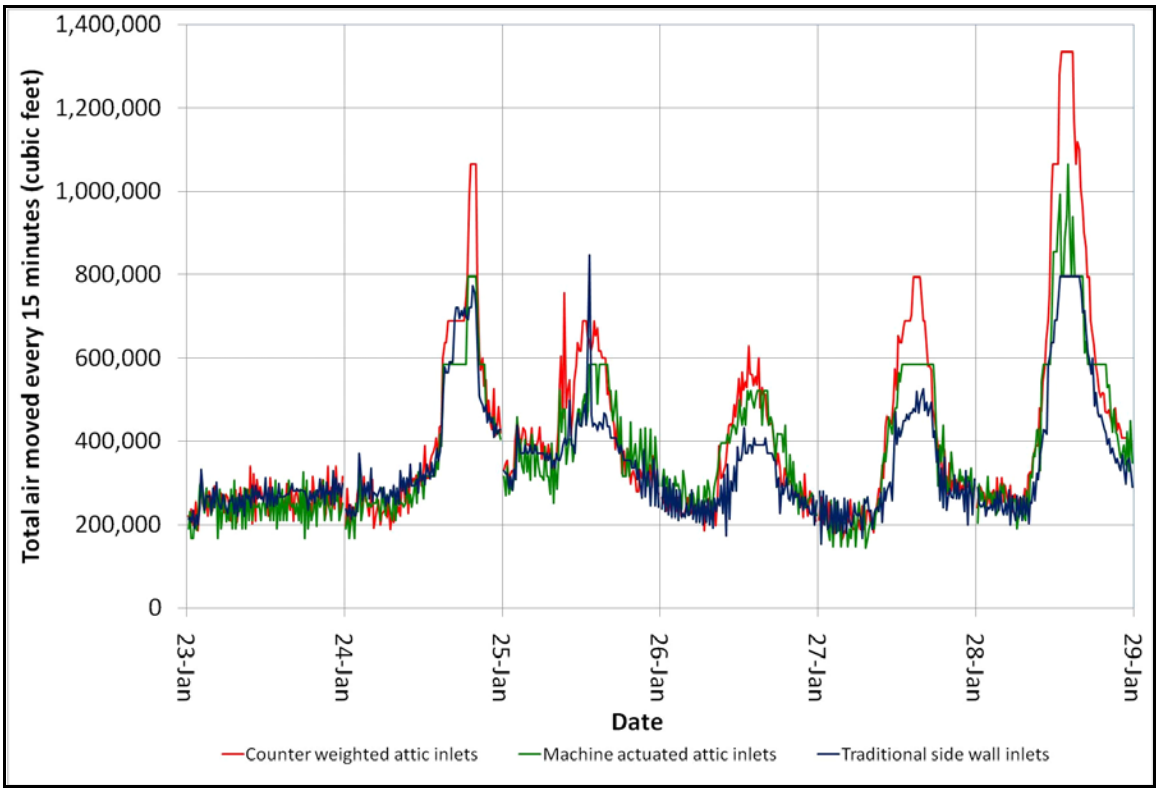

Figure 1. Air exchange rates in houses with different inlet systems.

The first issue encountered was that during the day the house with the machine actuated attic inlets tended to cycle between attic inlets and side wall inlets much as a house sometimes cycles between side wall inlets and tunnel ventilation. The house would begin to get a little warm, a 48" fan would come on, the attic inlets would close, and the side wall inlets open. This resulted in a relatively rapid decrease in house temperature which in turn resulted in the 48" fan shutting off and the house transitioning back from side wall to attic inlets. After a few minutes the attic inlets would once again begin to cause house temperature to slowly rise and the cycle start over. The root cause of the cycling was due to the simple fact that at one moment there was 30,000 cfm of relatively warm air coming out of the attic, the next there was 50,000 cfm 20°F colder air coming in through the house's side wall inlets. The either/or attic inlet system not only lead to greater variations in house air temperature but also an overall reduction in the amount of air pulled through the house over the course of the day as compared to the house with the counter weighted attic inlets where blending of attic and outside air occurred.

Figure 1 is a graph of the total amount of air exchanged every 15 minutes over a six day period for the two houses with attic inlets as well as one that was exclusively using traditional side wall inlets. At night or on rainy days (January 23) there was essentially no difference in the amount of air exchange in each of the three houses. During the day, when outside/attic temperature increased, the amount of air exchanged in each of the three houses became increasingly different. Ventilation rates were the highest in the house with the counter weighted attic inlets, the lowest in the house with traditional side wall inlets, with the house with machine actuated attic inlets falling roughly halfway between the two. Though the differences in air exchange rates occurred for a relatively small portion of the day, they did have a significant effect on overall daily air exchange rates. For instance, from January 24th through the 29th the house with the counter weighted attic inlets exchanged approximately 20% more air than the house with conventional side wall inlets. In the house with machine actuated inlets this difference was cut in half to 10%.

It is important to realize that this does not necessarily mean that counter weighted attic inlets are necessarily superior to machine actuated inlets, but rather it illustrates a very important point...if you want to maximize the benefits of any attic inlet system it is important to maximize its use. Producers should not be overly concerned with the fact that at times a house with attic inlets may operate a degree or two warmer during the day. The slightly warmer house temperatures will result in more fans running which will lead to improved house conditions. Any potential harmful effect of slightly higher temperatures would very likely be offset by greater amount of air movement generated by the extra fans operating. Furthermore, the extra air movement created by more exhaust fans operating aids in litter drying and ultimately better air quality as well.

So if you have a house where the attic inlets are controlled by a machine don't switch to your side wall inlets at the first sign of rising house temperatures. Allow your side wall inlets to work with the attic inlets to help maximize the amount of air moved through your houses each day. If you have counter weighted inlets, don't close them in the early spring for fear of overheating your birds. Your side wall inlet capacity far outweighs that of your attic inlets so no harm will come to their continued use. Bottom line the more air you can move through a poultry house each day the better off you are going to be.

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