

The Poultry Engineering, Economics & Management **NEWSLETTER**

***Critical Information for Improved Bird Performance Through Better House
and Ventilation System Design, Operation and Management***

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Cold Weather Inlet Management: A Common Sense Approach

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Cold weather is here and many broiler managers and farm operators are asking questions about the management of air inlets for cold weather. Proper air inlet management is crucial for maintaining dry floors and good rearing conditions in the broiler house in winter. To do inlet management right, it is important to understand all the factors that determine whether ventilation will be effective or not. House tightness, operating static pressure, number of minimum ventilation fans to be used, proper number of air inlets that should be used, and fan run time all play a role in determining what type of conditions we will have in our houses.

Houses must be tight to achieve proper static pressure

The first question that must be answered concerns house tightness. Is the house tight enough to use inlets effectively? This would mean that we would be able to pull at least a 0.10 to 0.12 static pressure with one 48-inch fan or two 36-inch fans with all inlets (and doors) closed. A really tight house may pull 0.15 to 0.25 inches under these test conditions. But if a 0.10 to 0.12 pressure is achieved with these fans in operation and all inlets closed, the house is sufficiently tight to use negative pressure ventilation.

The decision then needs to be made as to how many minimum ventilation fans will be placed on a timer. If houses are relatively loose, about a 0.10 to 0.12 static pressure, then it may be necessary to run two 48-inch fans for minimum ventilation. If houses are relatively tight, such as newer houses that will run 0.20 to 0.25 pressures, then perhaps one 48-inch fan or two 36-inch fans can be run for minimum ventilation. No one can make this decision for you. The individual manager will have to make a decision. In the looser houses that are approximately 0.10 to 0.12 static pressure, we are better off to run two 48-inch fans for minimum ventilation and cut the fan run time by 50%. In the tighter houses we have the luxury of running one 48-inch or two 36-inch fans and running for longer periods of time.

So you see that the amount of fan power that will be run for minimum ventilation varies depending on house tightness. The loosest 42 x 500 house might use two 48-inch fans or their

Traditional side wall air inlets need to open at least 2 inches so that the inlet will perform as a good air nozzle to throw incoming cold air high across the ceiling of the house. If inlets are not opened wide enough, or are opened too wide, incoming cold air will come in too slowly and will drop to the floor, chilling the birds.



equivalent for minimum ventilation while the tightest 42 x 500 might use one 48-inch or two 36-inch fans. Some houses will use one 48-inch and one 36-inch fan as the minimum vent fans.

Very loose houses cannot be ventilated with inlets

Some very old or very loose houses are just not tight enough to ventilate with air inlets. If houses are not tight enough, it is often better to just suck air through the cracks in the house, leaving the inlets closed. While sucking air into the house through the cracks is not the preferred method of ventilation, trying to use air inlets in a house that is not sufficiently tight can be a disaster. Opening air inlets at very low static pressures will drop large amounts of cold air on the floor, causing chilling, wet floors, and poor performance. A good rule of thumb is that if you cannot use your air inlets successfully using two 48-inch fans for minimum ventilation and achieve an operating static pressure of 0.10, then you are better off to leave the inlets closed and just bring air in through the cracks. Of course the preferred way to solve this problem is to tighten up the house. And for sure an old loose house will certainly benefit from mixing or stir fans to help mix the air.

Number of inlets used must be matched to number of fans running

The goal of minimum ventilation inlet management is to have the cold outside air coming through the inlets at high velocity and directed toward the center of the house above the birds, so as to get good mixing of cold outside and warm inside air. For minimum ventilation inlets to flow air properly they must open a minimum of 2-3 inches for a sidewall inlet or 1-1½ inches for a ceiling installed inlet. The static pressure controller automatically opens the inlets more or less so as to maintain proper static pressure -- so if there are too many inlets allowed to operate, the result will be that the controller will choke down the openings too much. As we have too often seen lately, houses running minimum ventilation with all inlets operating will have inlets opening only one-fourth to one-half inch, so that incoming cold air just sort of leaks into the house at the inlets and then falls to the floor. We don't get any air mixing because we haven't gotten any real air stream with any air velocity. This leads to wet litter, high humidity, ammonia, high fuel usage, and poor air quality.

In other words, for any given number of fans running there is a correct number of inlets to be used at the correct opening. If a tunnel house has been properly designed it may have anywhere from 48 to 80 air inlets installed. This is the total air inlet capacity for maximum ventilation when not in the tunnel mode. Four, five, or six tunnel fans can be run through these inlets. But what we need to look at in winter operation is how many inlets do we need if we are doing minimum ventilation running only one 48-inch fan, or one 48-inch and one 36-inch, or two 48-inch fans. Houses may be equipped with the number of inlets needed for maximum ventilation, but in winter cold weather we want minimum ventilation so many inlets must be closed or latched shut. The goal is to utilize the appropriate number of inlets to match the number of minimum ventilation fans in use. As the growout continues more inlets will be unlatched or put into service.

The exact number that should be used on a given farm will vary depending on the house. In most houses we should at least have operating inlets on each side no further apart than 24 to 30 feet, which usually would mean latching closed every other inlet so we allow only 15 evenly distributed inlets in the brood chamber to respond to the inlet machine. We would unlatch more inlets in the brood chamber only if we anticipated needing to run additional fans.

Of course for half house brooding situations it is very desirable to close all or most of the inlets in the non brood area. After turnout we typically need to unlatch more inlets in the growout end as more fans are used, and then finally as we get some age on the birds we unlatch them all. A good rule of thumb in a tunnel house is we need to have about 15 operating inlets for each 48-inch fan that we expect to be brought on during that phase of the growout or that prevailing weather.

Good inlet management: monitor and adjust static pressure and inlet openings

As we've said, the goal of minimum ventilation inlet management is to get cold outside air shooting through the inlets at high enough velocity and directed toward the center of the house above the birds. This requires having the right static pressure and the right amount of inlet opening, usually at least one inch for a ceiling inlet and two inches for a sidewall air inlet. Too wide an inlet opening, however, can be almost as bad as too small an opening. If the inlet board opens too wide it tends to direct cold air down toward the birds, not across the ceiling. It is also important that inlets all open uniformly the same. If some

Keys to Successful Use of Sidewall and Ceiling Inlets

Getting top performance from a broiler flock depends largely on doing ventilation right – and air inlet management is absolutely the key to providing the right environment during the critical starting and early growth phases. Here are the top points to keep in mind:

1. For inlets to work properly a poultry house must be tight.
2. Most poultry houses in the United States rely on negative pressure to flow air into the house during cool weather or brooding operations. The inlet is the tool to make this happen properly.
3. Inlets control direction of air movement, velocity of air entering the house, and thus air mixing. In cold weather, inlets are the tools to help blend cold outside air with warm inside air to save fuel and maintain precise temperatures. Good inlet management prevents all the hot air from being in the top of the house.
4. Curtain openings and board cracks are not good inlets because they are too large, not uniform and do not do a good job of directing airflow.
5. Static pressure inlet controllers work well to provide good airflow “throw” into the house under changing conditions, but only when the number of inlets available is matched to number of fans that will come on. All inlets on a house are to be used only for maximum power ventilation mode. During brooding and cold weather, a large number of the inlets are not only not needed, they must be closed off to assure good airflow.
6. Inlets must be open approximately one inch for a ceiling inlet and two to three inches for a sidewall inlet if we are to get the proper airflow patterns from the inlet. If your poultry house has all inlets opening one-quarter to one-half inch you need to latch closed every other inlet and then the remaining inlets will open twice as far.
7. Inlets opened beyond the “fully open” position (opening at tip of board equal to inlet throat opening) don’t increase airflow. Too wide board openings tend to direct air downward toward the birds, which would be acceptable only for older birds and very mild or warm weather.



Ceiling type inlets should open at least 1 inch to insure a good air nozzle effect. Traditional sidewall inlets should open at least 2 inches (see photo on page 1).



During visits in the field, we often see houses where inlets are opening only about 1/4 inch. This small an opening will not produce high velocity air and will result in very poor air mixing. Poor air mixing results in chilled birds, wet floors and high fuel costs.



An inexpensive latch or nail to seal off unneeded air inlets is perhaps one of the best tools in setting up houses for good winter airflow. The number of inlets to be used must be matched to number of fans that will come on. During brooding and cold weather, a large number of the inlets must be closed off to assure good airflow.

are opening wider or narrower than others, the result will be poor uniformity in the house, with cold and hot spots that will hurt flock performance and uniformity.

Since the static pressure controller interacts with the inlets, good inlet management requires monitoring inlet performance (how wide they are opening and what kind airflow is being achieved) and adjusting the controller for best performance. This assumes a tight house and that the right number of inlets are operating for the number and size of fans running, and is a fine tuning adjustment that will vary from house to house. The goal is to find the right operating pressure that gives proper inlet opening and best airflow into the house.

Do not allow obstructions to interfere with airflow

One problem often seen in the field is obstructions to airflow, such as water or electrical equipment, being placed directly in the air stream of the inlet. For both ceiling and sidewall style inlets we are trying to achieve high air velocity so we can throw or shoot the air into the house. We want to get the air flowing as smoothly as possible and attach the jet to the ceiling so it can travel to the center of the house. If when our house is built we allow water lines or electrical lines to be strapped to the ceiling right in the path of the airflow we are really hurting our ability to mix air properly. Builders need to be told about this and alternate locations for these utilities need to be worked out.

The Bottom Line

In houses with poor inlet management, as much as a 15 to 20 degree difference in floor and ceiling temperature has been observed. Good inlet management can keep this temperature difference to 5 degrees. The dollar benefits start with the fact that saved fuel costs keep money in your pocket. Houses with poor air mixing will use 20-25% more fuel. Plus the combination of temperature and air quality from day one is probably the most significant factor in broiler flock performance. Extreme temperatures can be devastating during the brooding period especially. Too cold conditions dramatically impact the ability of young birds to get adequate feed and water, and if early growth is slowed the performance losses cannot be made up during the life of the flock. The bottom line is that proper management of air inlets to provide birds the temperature and air quality they need is absolutely essential for getting top returns.

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