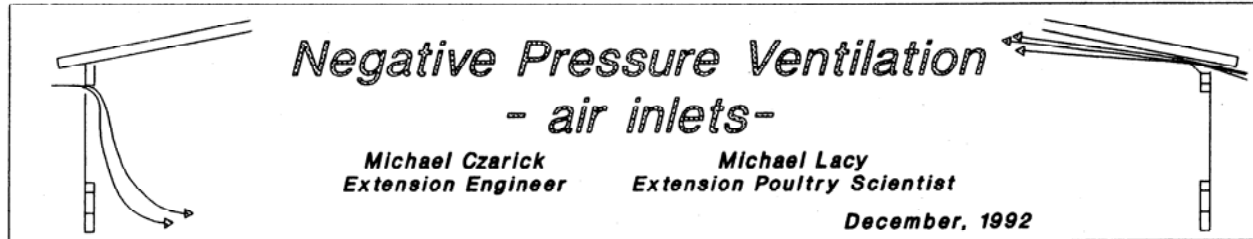




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Most poultry producers have two ways of ventilating their houses, curtains and exhaust fans. The biggest difference between these two methods of ventilation is the level of control they give a grower over house temperature and air quality. Curtain ventilation offers a relatively low level of control over air exchange and distribution and is therefore best suited for times when production will not suffer if too much air is brought in the house -- that is, when outside conditions are near what inside conditions should be. But, during cold weather when there is a fine line between bringing in too much fresh air and not enough, a system that gives more control over air exchange and distribution is needed, namely exhaust fans and air inlets (negative pressure ventilation).

In a negative pressure ventilation system, exhaust fans rid the house of stale air and draw in fresh air, while inlets distribute and direct the fresh air throughout the house. There are primarily three types of negative pressure ventilation systems used by poultry farmers in the southeastern United States. What distinguishes one from another is the type of air inlet used; a curtain crack (Figure 1), a fixed board crack (Figure 2), or adjustable inlets (Figure 3).

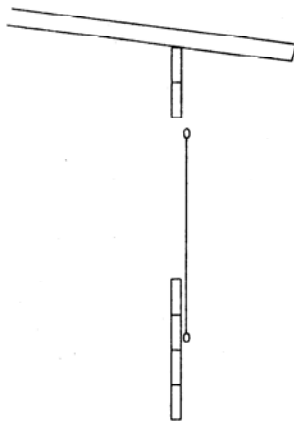


Figure 1 Curtain

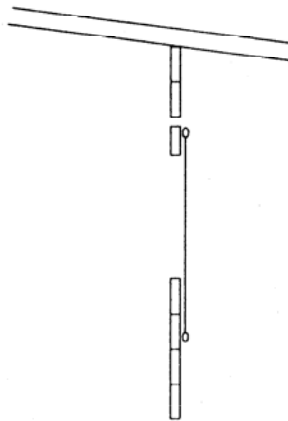


Figure 2 Board

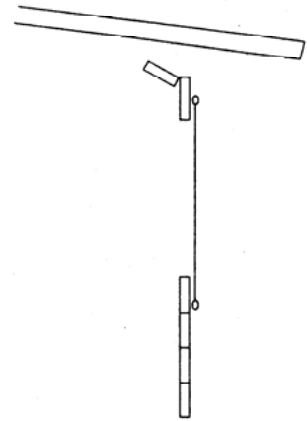


Figure 3 Adjustable

These three types of air inlets are similar in that they help ensure a precise amount of air is brought in, that the air enters uniformly throughout the house, and the amount of cold air entering the house when the fans are off is kept to a minimum. However, they differ in their ability to control the direction of air once it enters the house and in the amount of mixing they produce, both of which are very important in providing an optimum environment. Curtain cracks tend to direct the air toward the floor, which sometimes leads to chilling of the chicks

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and litter caking (Figure 4). Fixed board cracks are an improvement because the air is directed straight into the house, instead of downward, but this is not ideal either.

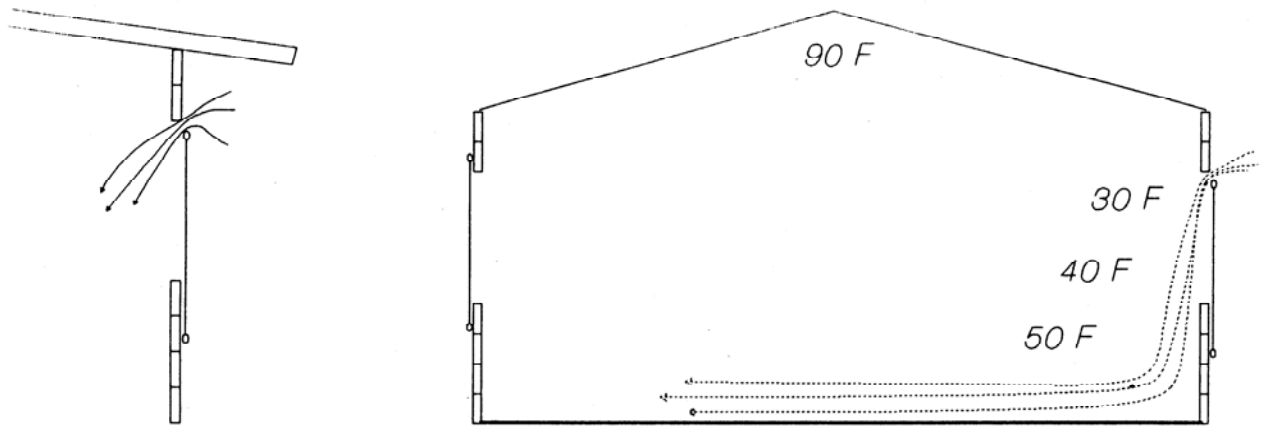


Figure 4. Negative pressure ventilation using a cracked curtain

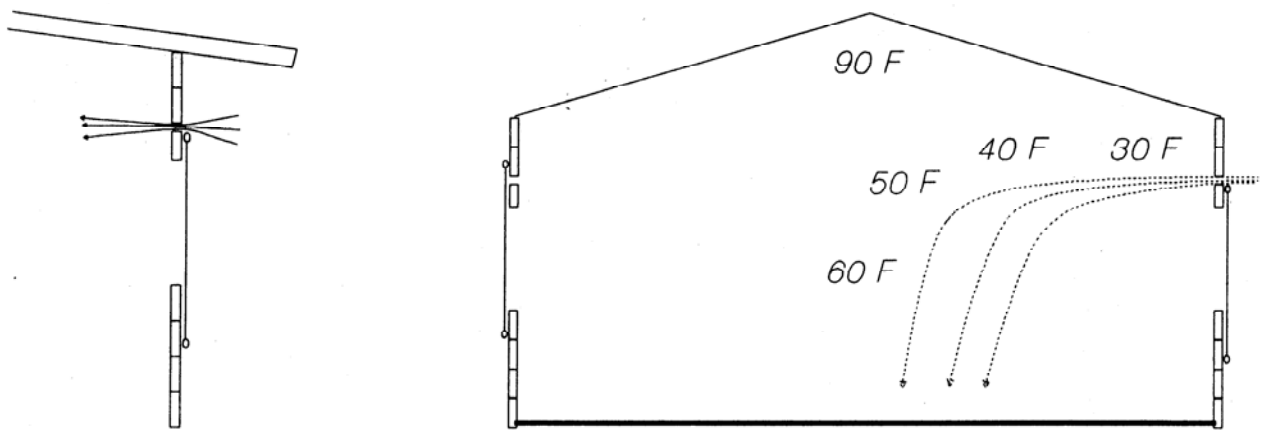


Figure 5. Negative pressure ventilation using a fixed board crack

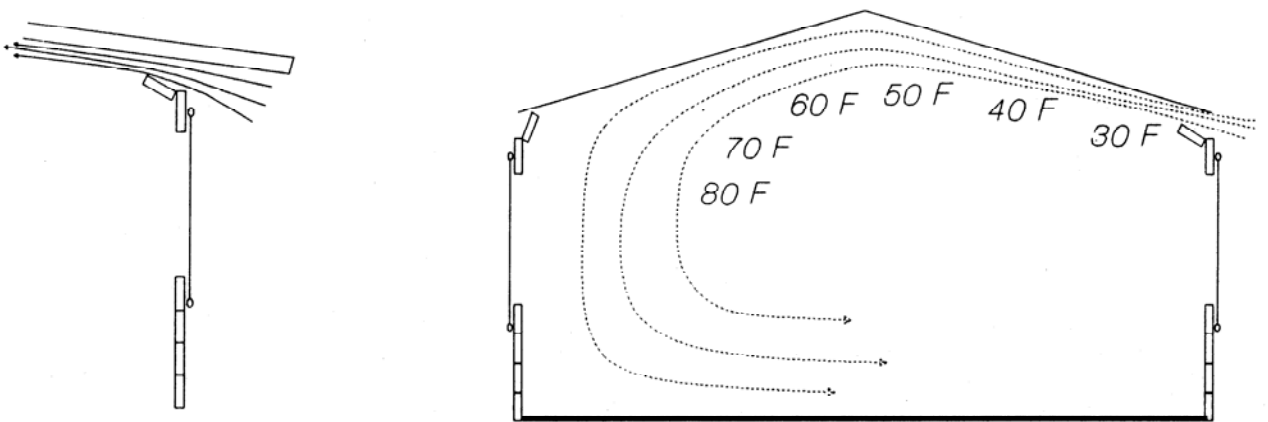


Figure 6. Negative pressure ventilation using adjustable inlets

Since the incoming cold air isn't directed toward the ceiling it doesn't mix with the warmest air in the house, limiting the amount of preheating which can take place. The relatively cool air drops to the floor about 10' from the side wall, causing draftiness and the activation of brooders or furnaces (Figure 5). To get maximum preheating, as well as the gentle mixing of the air in the house, adjustable inlets are required. Air entering through adjustable inlets moves along the ceiling where it is warmed. It then moves down to and across the floor, providing warm fresh air to the birds and removing excess moisture from the litter (Figure 6).

Though adjustable inlets are the most effective way to ventilate a house in terms of providing maximum air quality and minimum fuel and electricity usage during cold weather, there is a way to improve conditions in houses which use a fixed board crack or even curtain cracks for inlets. The primary difference between adjustable inlets and board/curtain cracks is the mixing of the warm air near the ceiling with the cold air entering through the inlets. This mixing action can be created through the use of circulation fans.

A typical cold weather mixing fan set up would consist of four 36" fans controlled by a 10-minute timer. One fan would be located approximately 60' from the each of the end walls and another two located 60' on either side of the center of the house. The fans nearest the end walls would direct air toward the end walls while the fans nearest the center of the house would blow air toward each other (Figure 7). The circulation fans would be located in the middle of the house, four to five feet off the floor, tilted slightly toward the ceiling to minimize drafts on the birds. In houses over 400' it may be necessary to add a circulation fan between the fans in the center of the house and those near the end walls to provide air mixing for the total house.

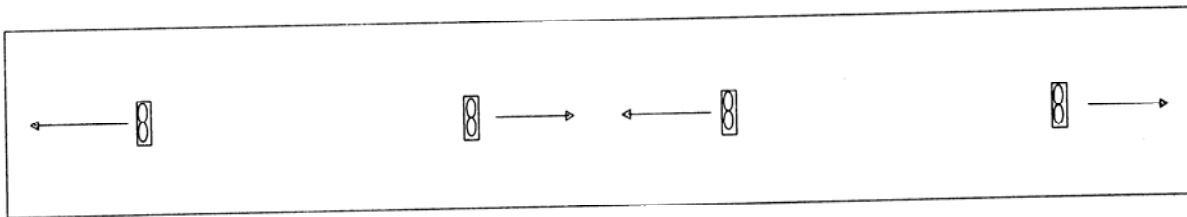


Figure 7. Circulation fan placement

When the circulation fans are operating, "circular" air flow patterns are generated. Air exiting the fans near the end walls of the house bounces off the wall and moves in the opposite direction down the side walls. Air from the two center fans collides and moves down the side walls toward the end walls. The side wall air flows meet and return to the circulation fans (Figure 8).

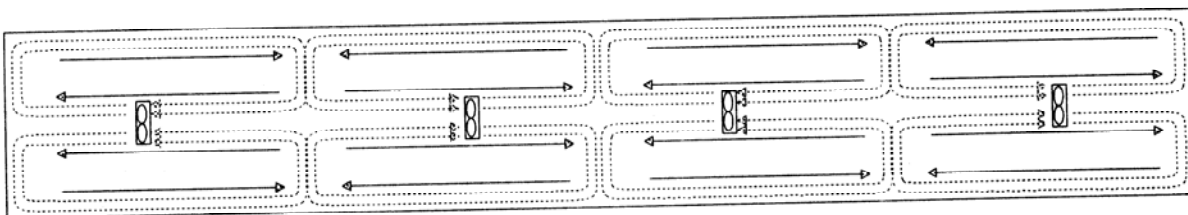


Figure 8. Full house air circulation pattern.

There are numerous benefits associated with mixing fans. The circular air flow pattern takes the warm air off the ceiling and mixes it with the cold air entering through side wall cracks before it can chill the floor. The fans move warm air toward the coldest areas of the house, namely end walls and the brooding curtain, as well as over the litter, promoting dryer conditions. During brooding, the use of two circulation fans can help reduce fuel usage by reducing temperature stratification (Figure 9).

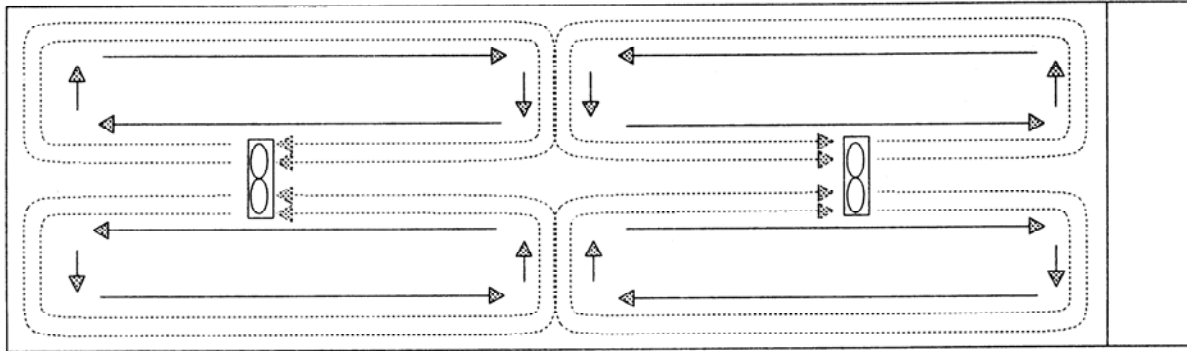
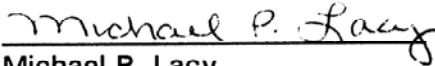


Figure 9. Half house brooding air circulation pattern.

It is not necessary to run the circulation fans continuously. The timer should be set so that the circulation fans come on a minute before the exhaust fans come on to start the mixing process and to stay on until the exhaust fans shut off. If the birds appear to be chilled or the floor becomes too dry, the circulation fans may need to be raised farther off the floor or tilted more towards the ceiling. In some cases it may be necessary to reduce the amount of time the circulation fans run.


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