



# The University of Georgia Cooperative Extension Service

College of Agricultural and Environmental Sciences / Athens, Georgia 30602-4356



A negative pressure ventilation system is much less complicated than most growers think. Though computerized fan controllers and inlet machines can be a valuable part of a negative pressure system, there are only two components a system must have, exhaust fans and air inlets. The exhaust fans allow the producer to generate a partial vacuum within the house and control the amount of fresh air entering a house, while the inlets allow him to control where the air enters the house, as well as direct the air either toward the ceiling in the winter or toward the floor in the summer.

In order for a negative pressure ventilation system to be effective, it is important that the amount of inlet opening be properly matched with the number of exhaust fans. If too much inlet opening is provided, the static pressure will be too low. Low static pressures result in poor fresh air distribution, draftiness, litter caking, and high fuel bills. Conversely, if a house does not have enough inlet opening, the static pressure will be too high. High static pressures decrease fan performance and may put undue strain on dropped ceilings. Fortunately, the range of acceptable static pressure is fairly wide.

Under most conditions, a negative pressure ventilation system will work nearly the same at any pressure within the range of 0.05" to 0.10". The only difference is that the air will enter faster at a pressure of 0.10" than at 0.05". The added speed is important during very cold weather when we want to make sure the incoming air stays next to the ceiling as long as possible. The faster the air comes in, the better mixing we get between the cold fresh air and warm air at the ceiling. This prevents cold entering air from dropping to the floor before it is fully warmed.

Since there is a range of static pressure to work within, there is a corresponding range of inlet opening which can be used. The range of static pressure roughly corresponds to an inlet opening of 10 to 20 square feet per 36" fan (10,000 ft<sup>3</sup>/min). When designing a ventilation system, the minimum amount of inlet opening required per fan is used to keep equipment and installation costs reasonable.

Since the amount of inlet opening required depends on the number of fans in a house, when designing a ventilation system a grower must first determine how many exhaust fans the house will have (see Negative Pressure Ventilation "How Many Exhaust Fans Do I Need?" October-November, 1991). Once this is determined the inlets required can be calculated based on the maximum number of fans with which the grower would power ventilate, providing 10 ft<sup>2</sup> of inlet per 36" fan (20 ft<sup>2</sup> per 48" fan).

In a tunnel-ventilated house the amount of inlet required should be based on the premise that you may want to pull up to 75% of your tunnel fan capacity through your side wall inlets. This number of inlets allows a grower to power ventilate year round if desired. In addition, if the inlets are placed on an inlet machine, the grower will not have to worry if he doesn't switch the house over to tunnel ventilation at exactly the right time. Furthermore, if the house is automated to go to tunnel ventilation on its own and the tunnel curtain doesn't open, there will be enough inlet opening available that the birds would not

## PUTTING KNOWLEDGE TO WORK

suffer.

Because the size of the inlets is variable, there is good deal of flexibility in how many inlets a house requires. The table below shows the number of inlets a house requires based on the number of exhaust fans used and the size of the inlets. This chart does not account for air entering through any cracks in the house. As a result the static pressure resulting from these combinations of fans and inlets may be on the low side if a house is not fairly tight.

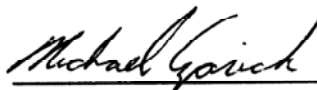
Inlet Size	Number of 36" Exhaust fans					
	2	4	6	8	10	12
4' X 4"	15	30	45	60	75	90
4' X 6"	10	20	30	40	50	60
4' X 8"	8	16	24	32	40	48
4' X 10"	6	12	18	24	30	36
5' X 4"	12	24	36	48	60	72
5' X 6"	8	16	24	32	40	48
5' X 8"	6	12	18	24	30	36
5' X 10"	5	10	15	20	25	30

**Figure 1. Number of Inlets Required**

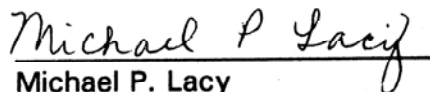
It is important to realize that just because you have enough inlets for all the fans in your house doesn't necessarily mean all of the inlets would be used all of the time. For instance, if a house has enough inlets for six fans but only two are on, two thirds of the inlets could be used or all of them could be closed two thirds of the way. As long as the static pressure is within the range of 0.05" and 0.10", either way will work (see Negative Pressure Ventilation - Inlet Machines, January 1993).

Here are some other factors to consider when installing inlets in a poultry house:

- 1) Space inlets evenly on both sides of the house.
- 2) Do not place inlets closer than eight feet from an exhaust fan.
- 3) Generally, it is better to have larger inlets rather than smaller ones.
- 4) Place inlets as close to the ceiling as possible.
- 5) Inlets can either be placed directly across from one another or staggered.
- 6) Inlets should be placed on a cable and hand winch to aid adjustment.



Michael Czarick  
Extension Engineer



Michael P. Lacy  
Extension Poultry Scientist