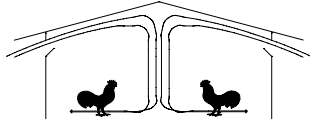




The University of Georgia

Cooperative Extension Service

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



Poultry Housing Tips

Using Smoke Emitters in Poultry Houses

Volume 14 Number 7

September, 2002



One of the challenges in ventilating a poultry house is that we can't see what we are trying to control, namely air flow into and around the house. When the fans come on it is difficult to determine if the cold air entering through the side wall inlets is making it all the way to the center of the house or falling to the floor just a couple of feet from the side wall. For that matter, we can't tell if most of the air the exhaust fans are bringing in is coming in through the air inlets or from cracks around the side wall curtains and end wall doors. Furthermore, because we can't see air movement within the house, it is difficult to determine how changes in ventilation system management such as inlet opening, static pressure settings, or circulation fan run time affect the mixing of hot air produced by brooders/furnaces with cold air entering through the side wall inlets.

One of the best ways for producers to evaluate how well their ventilation system is operating is through the use of smoke emitters. Smoke emitters allow producers to see how air is flowing into, within and out of their poultry houses, making it much easier to spot potential problem areas as well as to better evaluate the possible solutions to these problems.

PUTTING KNOWLEDGE TO WORK

COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES, COLLEGE OF FAMILY AND CONSUMER SCIENCES
WARNELL SCHOOL OF FOREST RESOURCES, COLLEGE OF VETERINARY SCIENCES

The University of Georgia and Fort Valley State University, the U.S. Department of Agriculture and counties of the state cooperating.
The Cooperative Extension Service offers educational programs, assistance and materials to all people without regard to race, color, national origin, age, sex or disability.
An equal opportunity/affirmative action organization committed to a diverse work force

Smoke emitters come in a variety of sizes as well as colors. Smoke emitters are typically classified by how long they burn and the volume of smoke they emit. They come as small as 45-second (150 ft³) or as large as eight-minute (18,000 ft³). Forty-five-second, low-volume smoke emitters are best used to take a quick peek at how air is entering through a small crack or side wall inlet when there are large birds in a house. Ninety-second (600 ft³) smoke emitters are more general use smoke emitters. They produce enough smoke for a producer to take a good look at how air is entering the house over an entire timer fan cycle or evaluate leakage over a large area of side wall. Ninety-second smoke emitters are best used when there are small birds in a house where bird movement away from the smoke will not present a crowding problem. The high-volume smoke emitters (4 minute/2,500/ft³ or 8 minute/18,000 ft³) are best used when there are no birds in the house and you want to fill a house with smoke to determine where air is leaking out of a house when the fans are off.

Colored smoke emitters typically cost about 20% more than traditional white smoke emitters. They are available in yellow, red, orange, blue and green. Care must be taken when using colored smoke emitters because they can stain building surfaces if placed too close. The primary use for colored smoke emitters is for video taping because the darker colored smoke tends to show up a little better on film than white smoke.

When purchasing smoke emitters make sure that they are of the non-firework (sulfur-based) variety. Many firework type smoke emitters produce a relatively toxic smoke that can irritate the eyes and lungs of people and chickens. Furthermore, the smoke produced by many firework type smoke emitters can be well over 1,000°F, which not only can lead to the burning of surfaces of the poultry houses if placed too close, but make it difficult to accurately determine actual air flow patterns within a poultry house. Smoke emitters should produce relatively cool smoke (300°F). In addition to being safer, the cooler smoke when placed a foot or so from the outside of a house quickly assumes outside air temperature before entering the house so a more accurate representation of air flowing into a poultry house can be obtained.

There are a number of different ways to use smoke emitters that can help improve bird performance as well as reduce energy usage. The following tests are best conducted just prior to chick placement when the house has been heated to approximately 90°F and the outside temperature is below 40°F, using a 90 second smoke emitter.

- 1) Light a smoke emitter in the center of your brooding area with the exhaust fans turned off. Ideally the smoke should rise straight up and stay roughly in the vicinity of the smoke emitter. If the smoke moves towards one end of the brooding area or the other this is typically an indicator that the house is loose. What is happening is the wind outside the house is entering the house, moving down the length of the house, exiting at the far end and taking the heat with it. The side wall curtains should be examined for top and bottom overlap as well as to see if they are being held tightly against the side of the house by curtain straps/strings.
- 2) With the fans off, hold a smoke emitter (with pliers) directly over an operating brooder. You will see the hot air quickly rise to the ceiling and collect there, forming a cloud of smoke. Turn on your timer fans and let them operate for approximately 45 seconds or whatever your typical timer fan setting is when the chicks are a week old. Observe how the air enters through the side wall inlets. Is the air entering through the inlets making it all the way to the center of the house and moving the smoke down to floor level? Wait about a minute and then examine the house again. If the minimum ventilation system is working properly the smoke should be fairly well distributed from floor to ceiling. If after a minute a large amount of smoke remains at the ceiling or the air next to the floor is free from smoke, adjustments probably need to be made to the inlet system. Try the following:
 - a) Latch closed some of the inlets. This should cause the remainder of the inlets to open a little more, producing better air mixing.
 - b) Raise or lower your static pressure settings a point or two. Lowering the static pressure will cause the inlets to open a little. Raising the static pressure will result in the inlets closing a little but the air will

enter with greater speed. In either case, make sure that you do not set your static pressure below 0.05" or above 0.12". A static pressure setting below 0.05" will cause the air to enter with insufficient speed to make it to the center of the house during cold weather. Furthermore, low pressure settings can result in exhaust fans not pulling air in uniformly down the length of the house. A static pressure setting above 0.12" will place excessive force on dropped ceilings as well as result in reduced fan performance.

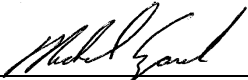
- c) Increase timer fan "on time" by 15 seconds.
- 3) Standing outside the house hold the smoke emitter approximately one foot from a side wall inlet. Have someone inside the house turn on the timer fans typically used during brooding and then observe how the air enters the house. Is the cold air, traveling along the ceiling, making it all the way to the center of the house? Are there any obstructions in the ceiling that are making it difficult for the air to reach the center of the house? Make the same changes listed above and retest.
- 4) With the inlets closed, turn on enough exhaust fans to obtain approximately 0.08" static pressure. With someone standing inside, walk along the outside of the house with a smoke emitter approximately 3" from the side of the house and make note of where most of the smoke is entering the house. Areas to pay special attention to:
 - a) Top of the side wall curtain
 - b) Bottom of the side wall curtain
 - c) Area around the inlets
 - d) Very top of the side wall at the truss plate
 - e) In houses with a concrete stem wall, at the junction of the wooden wall and stem wall
- 5) With the inlets closed, turn on enough exhaust fans to obtain approximately 0.08" static pressure. With someone standing inside, walk along the outside of the house in the vicinity of the tunnel curtain with a smoke emitter approximately 3" from the side of the house. Check for leakage along the top and bottom of the tunnel curtain as well as at the ends of the tunnel curtain.
- 6) With the inlets closed, turn on enough exhaust fans to obtain approximately 0.08" static pressure. With someone standing inside, walk along the outside of the house in the vicinity of the tunnel fan shutters. Let the smoke rise into the fan housing and check for leakage. Then check for leakage where the housing and the side wall meet.
- 7) Standing on the nonbrooding end of the house, with someone on the brooding end of the house, check for air leakage from the nonbrooding end to the brooding end with and without timer fans running. Make sure you run the smoke emitter along the top, bottom and sides of the brooding curtain.
- 8) With the inlets closed, turn on enough exhaust fans to obtain approximately 0.08" static pressure. Hold a smoke emitter a few inches from the bird boards between the trusses and let the smoke drift up into the attic space. Have someone inside the house check for leakage at the top of the side wall.

The following tests are best conducted during warmer weather when there are no birds in the house using a 90 second smoke emitter:

- 1) Open the tunnel curtain and turn on all the tunnel fans. Hold a smoke emitter approximately ten feet upstream from objects such as side wall furnaces, brooders and migration fences to see how they affect the flow of air down the house.
- 2) With all the tunnel fans operating, stand near the tunnel curtain with a smoke emitter. Examine how the air enters and moves down the house. Turn off half of the tunnel fans and note the changes in air flow patterns.

- 3) With the tunnel curtain fully opened and all the tunnel fans operating, standing outside your evaporative cooling pad “dog house” and hold smoke emitter a few inches from the bird boards between the trusses and let the smoke drift up into the attic space. Have someone inside the dog house check for leakage.

Smoke emitters are the best money any producer can spend. With just a few dollars worth of smoke emitters a producer can check for air leakage which leads to increased heating costs in the winter and cooling costs in the summer, evaluate air flow patterns through their inlets to insure that they are not chilling their birds during cold weather and evaluate the flow of air down their houses when tunnel ventilating.



Michael Czarick
Extension Engineer
(706) 542-9041 542-1886 (FAX)
mczarick@engr.uga.edu
www.poultryventilation.com

Provided to you by:

Source for smoke emitters:

Regin HVAC Products
(203) 922-0033
www.regin.com