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Poultry Housing Tips

How Many Timer Fans Should I Use?

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As a general rule, it is better to run fewer exhaust fans on interval timers for minimum ventilation. This is because using a large number of timer fans leads to wide variations in house temperature and air quality, thus leading to poor bird performance and excessive fuel usage. For instance, let's say you had a choice of running either three 36" fans two minutes out of five or six 36" fans one minute out of five. In both instances you would bring in the same amount of air over the five-minute time period, namely 60,000 cubic feet of air. But, by bringing in such a large amount of cold air over a relatively short period of time, house temperature will decrease much more than if a smaller amount of air were introduced over a longer period of time, causing the furnaces or brooders to come on. Furthermore, since the exhaust fans are off for a longer period of time (four minutes vs. three minutes) air quality will tend to vary more.

An example of this phenomenon would be if you were sitting in a small shed on a cold day with a couple of small gas heaters. As you sat there, one heater would probably run fairly constantly to offset the the heat lost through the walls, windows, ceiling, and floor. If you cracked the window slightly a small amount of cold air would come into the room constantly and the air temperature might fall, causing the heater to run a little more, but the temperature of the air within the shed would probably remain fairly constant. But, if you were to open the door of the shed for a minute or two, the temperature of the air in the room would drop dramatically. After the door was shut you would probably have to turn on both heaters (and likely a third if you had it) to quickly get the air temperature back to an acceptable level. If this process was repeated every five minutes or so, you would probably end up sick and with a large gas bill.

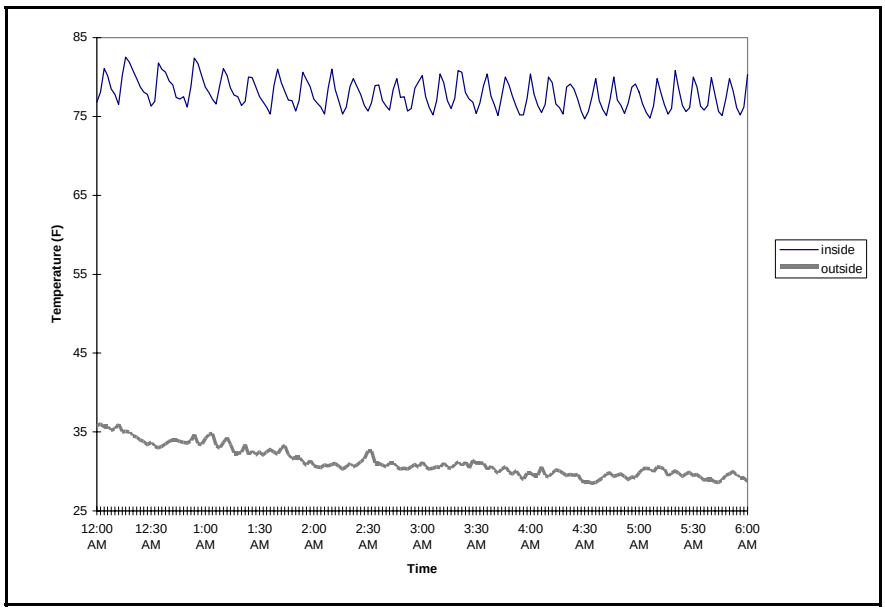

Figure 1. 30,000 cfm, four minutes out of ten

Like in the above example, by running a large number of timer fans in a broiler house you overwhelm the heat that is built up within the house with cold air, resulting in a large drop in house temperature. The brooder or furnaces must come on every time the fans

come on to quickly build back up the heat which was lost, causing excessive fuel usage. And since the fans are off for a longer period of time, ammonia, dust, and moisture tend to build more.

Temperature variations associated with using a large number of timer fans were observed on a broiler farm where air temperature was being monitored. The grower wanted to decrease the level of ammonia in his houses so he changed from drawing in 30,000 cfm four minutes out of ten (Figure 1) to 60,000 cfm three minutes out of ten (Figure 2), an increase of 33 percent. As you can see, even though the amount of fresh air brought into the house was increased by only 33 percent, the temperature variation increased 300% from approximately four degrees to over 15 degees (The average house temperature is lower in Figures 2 and 3 because the set point was lowered). With this much temperature variation it is easy to see how the the furnaces or brooders would come on every time the timer fans ran.

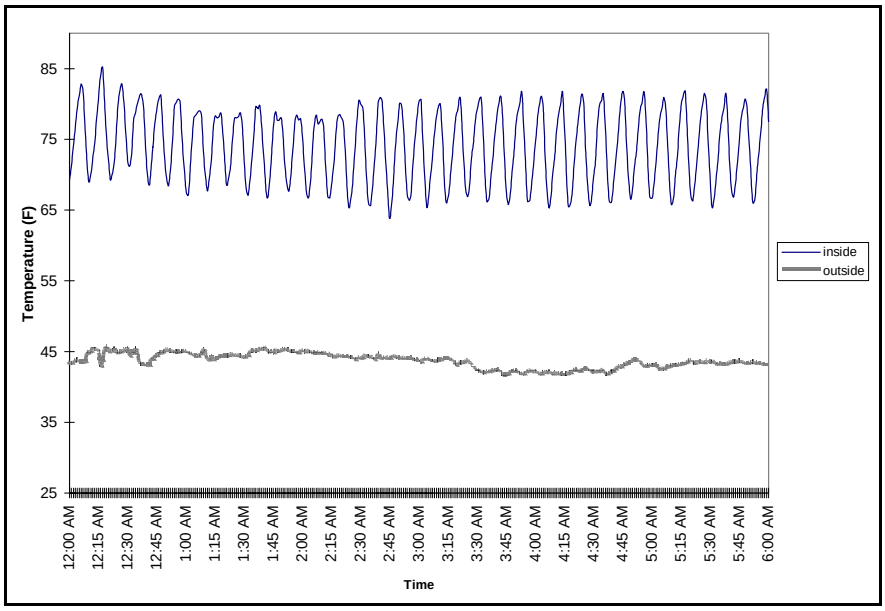

Figure 2. 60,000 cfm, 3 minutes out of ten

The following week, the number of timer fans was reduced to three 36" fans (30,000 cfm) and the timer setting was increased to 2 1/2 minutes out of five (a 15% reduction in the amount of fresh air drawn in from the previous week). By reducing the number of timer fans operating as well as switching to a five-minute timer, the amount of temperature variation was reduced to less than four degrees (Figure 3).

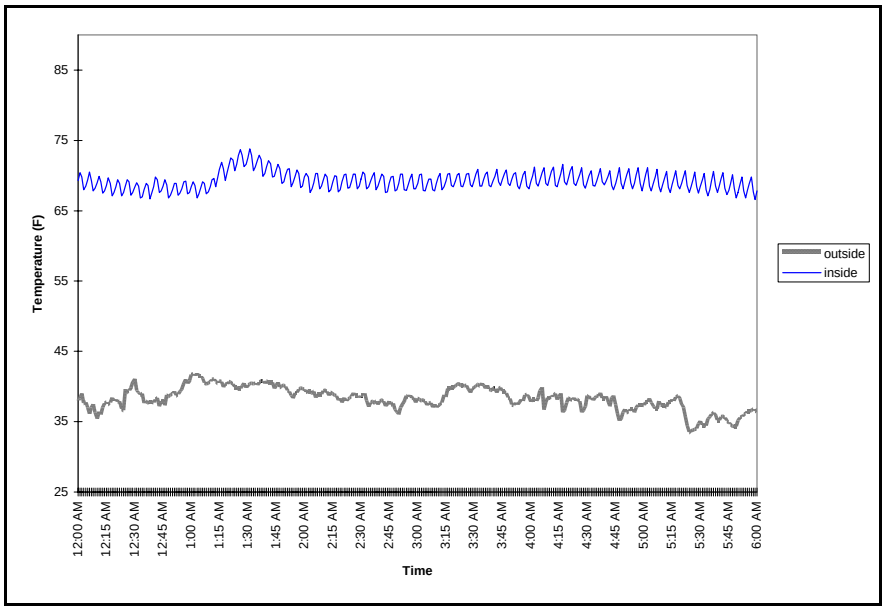

Figure 3. 30,000 cfm, two minutes out of five

Though reducing the number of timer fans can help maintain more uniform house conditions, if too few timer fans are used, other problems as bad as those described above can occur. For instance, with only one or two timer fans (depending on house tightness) it may not be possible to generate an adequate static pressure. This could result in fresh air not being drawn in evenly throughout the house, because without a static pressure exhaust fans will only draw in fresh air through those inlets that are relatively close to an exhaust fan. Futhermore, without adequate static pressure, air entering through inlets may not have enough speed to make it to the center of the house before dropping, causing drafts and excessive fuel usage.

The object of a negative pressure ventilation system is to run enough timer fans to create a static pressure between 0.05" and 0.10" with at least one inlet open a few inches, every 40 feet or so. In most houses, with the birds in full house, this will require somewhere between three and four 36" fans (or a combination of 36" and 48" fans to total between 30,000 and 40,000 cfm). If more exhaust fans than this are required to obtain the desired static pressure, you should probably concentrate on tightening up your houses.

In conclusion, to keep temperature and air quality variations to a minimum, increase your timer settings, not the number of timer fans, when you want more fresh air. If you want to increase the number of timer fans operating, do it gradually. If you feel that two 36" fans are not doing the job, and you want to increase the number of fans, increase it to three fans, not four or five. In general, very few houses need more than four 36" fans (or 40,000 cfm equivalent...ie, two 36" fans and one 48" fan) to be used as timer fans. Again, it is better to run fewer fans longer, than more fans for a shorter period of time.

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Other *Poultry Housing Tips* newsletters on timer fans:

Negative Pressure Ventilation: How Many Fans Do I Need? October/November, 1993
Ten-Minute Vs. Five-Minute Interval Timers? February, 1995

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