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Poultry Housing Tips

Ten-Minute vs. Five-Minute Interval Timers

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Interval timers are the most popular method of controlling and limiting the amount of fresh air brought into a house by exhaust fans during cold weather. A 36" fan will move approximately 10,000 cubic feet of air each minute it operates. But there are many times a grower may want considerably less air than this to be brought in. For instance, in the average 400- foot house during the first week of production, we only need about 2,000 cubic feet of fresh air each minute. During the fourth week, we may only need 8,000 cubic feet of fresh air each minute. To allow for this, growers place their minimum ventilation exhaust fans on ten-minute interval timers. If a single 36" fan runs for one minute then shuts off for nine, it will move an average of 1,000 ft^3/min over the ten-minute period. If we turn it on two minutes and shut it off for eight, it will move an average of 2,000 ft^3/min of air over the ten-minute period, and so on.

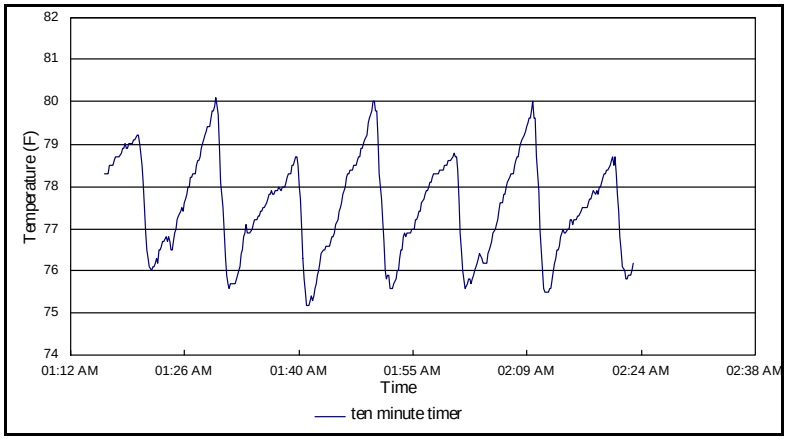

Figure 1. Temperature variations in broiler house using ten-minute interval timer.

We could install a number of smaller fans - for instance, a 12" fan (1,000 ft^3/min), 16" fan (2,000 ft^3/min) and a 24" fan (5,000 ft^3/min), and run the right combination to draw the desired amount of fresh air into the house constantly. Or to make things simpler, we could install a variable-speed 36" fan. But, there is one major problem with both these ideas. It would be virtually impossible to establish a static pressure with fans that move such small amounts of air. Most growers would agree that it is nearly impossible to get a static pressure in a house using a single 36" fan that moves 10,000 ft^3/min of air and as a result are forced to use a two or three fans. Could you imagine how tight a house would have to be to get a pressure with an 16 inch fan which moves only 2,000 ft^3/min? And without a static pressure the

exhaust fans would only ventilate those birds that are near the fans, side wall inlets would not work properly, and air quality would suffer.

The only problem with using interval timers is that they cause variations in air temperature and quality. For instance, when we run a fan for a minute and a half out of ten the house temperature decreases during the minute and a half the fan operated but the air becomes fresher. During the eight and a half minutes the fan is off, heat, moisture, ammonia, and dust build up. The net result is that the environment cycles between a warm, stale environment and cold, fresh environment (Figure 1).

Figure 1 was generated from the data collected in a 500' broiler house with four-week-old birds, with one 48" and two 36" fans operating off a ten-minute timer (outside temperature was in the low thirties). Though a four-degree variation may seem like a lot, it is fairly typical of what you see on most farms using a ten-minute timer. If the amount of time the fans operate is increased, the variation may increase to ten degrees or more.

Though most producers realize that the amount of time the fans run affects temperature uniformity, there is another factor that is not as obvious; that is the total length of the timer cycle, i.e., ten minutes. Timer cycle length has a lot to do with the magnitude of the variation in air temperature and air quality. For instance, let's say instead of running the fans for a minute and a half out of ten we ran them nine minutes out of sixty. The total amount of time the fans would operate during an hour would be the same, but the variation would be much greater, theoretically, five times greater. The house would get very cold during the nine minutes the fan were on, and would get very warm and stale during the fifty one minutes the fans were off. (From a practical standpoint, your birds would probably be dead after the first cycle.)

The fewer time cycles you have over the course of an hour; the more inconsistent house air temperature and quality becomes. For instance, if the test house had been operating off a twenty-minute (3 min. out of 20 min.) instead of a ten-minute timer the variation would have been approximately 8 degrees. A thirty-minute timer (4 1/2 min. out of 30) would have produced a variation of approximately 12 degrees.

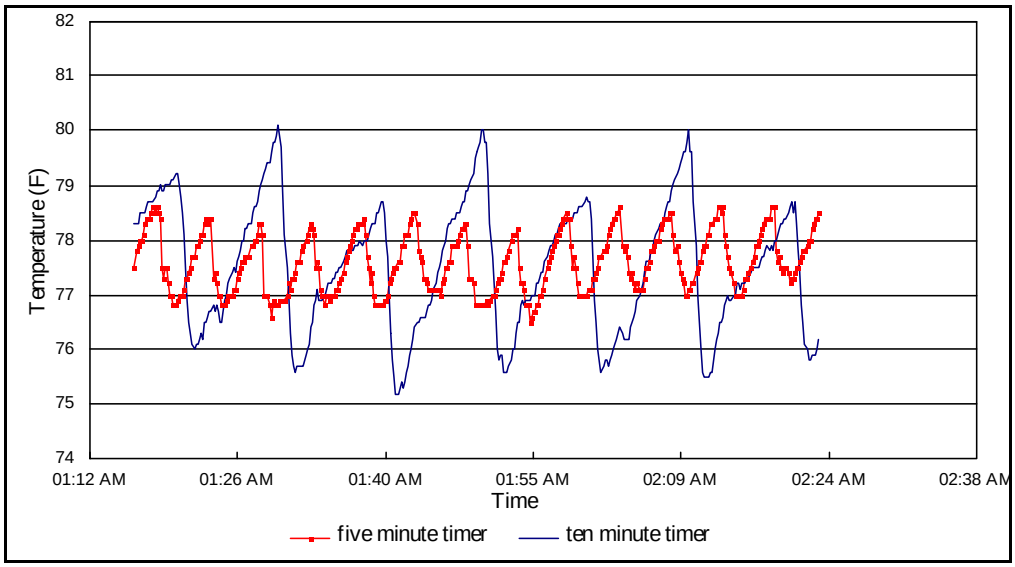

Figure 2. Temperature variations in broiler houses using five and ten-minute interval timers.

But, what if instead of a ten-minute timer, a five-minute timer was used? In the house next to the one described above, that is exactly what was used. The variation in that house was not four degrees, but about a degree and a half (Figure 2). Though air quality was not directly measured during the study, it was very noticeable by the people on the farm that the air quality in the house with the ten-minute timer was poor by the end of the eight and a half minute off time.

A week later the test was repeated. During this test the five-minute timer was increased to one and a half minutes out

of five while the ten-minute timer was increased to three minutes out of ten. Though the time the exhaust fans were operating was doubled, the variation in house temperature was not significantly increased in either of the houses. This was probably due to the fact that outside temperature during the second test was approximately 15 degrees warmer than during the first test.

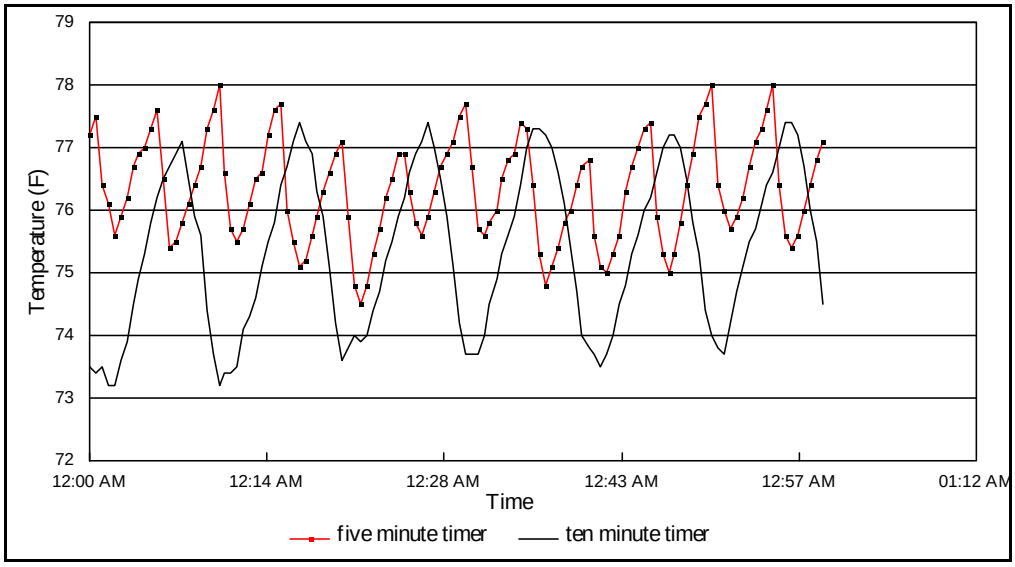

Figure 3. House temperature variations with five- and ten-minute interval timers.

During the tests another problem was observed; the brooders ran more often in the house with the ten-minute timer than they did in the house with the five-minute timer. The fans and furnaces in both houses were controlled by an environmental controller. The controller was set up so that if the house temperature dropped two degrees below the desired house temperature, the furnaces would come on. The desired house temperatures were 78°F and 76°F during the first and second tests, respectively. The larger variations in temperature in the house with the ten-minute timers resulted in the heaters coming on more often than in the house with the five-minute timer.

It is true that the furnaces would not come on if the controller had been reprogrammed so that the heat was not called for until the house temperature dropped four or five degrees below the desired house temperature. But, if the house would have had thermostats instead of an electronic controller, it would have been much more difficult to keep the heat from coming on every time the minimum ventilation fans operated. Bottom line, if you use a ten-minute timer, the heat is more likely to come on than if you were to use a five-minute timer because of the larger variations in house temperature.

A ten-minute timer works against you in two ways. The on time will be twice that of a five-minute timer, which means that every time the fans come on the house temperature will drop twice as much as it would in a house with a five-minute timer. This of course results in colder house temperatures and increased fuel usage. The off time of a ten-minute timer is also twice that of a five-minute timer, which means ammonia, dust, heat and moisture will build up twice as much as in a house using a five-minute timer.

When brooding young birds, there is nothing wrong with running fans for as little as 30 to 45 seconds with a five-minute timer, because your off time is relatively short. On a ten-minute timer the problem with running your fans for short periods is that the fans will be off for more than nine minutes. It is important to remember that many times it is not the on time that determines air quality, but rather, how long the fans are off. You may feel that running a few 36" fans for only a minute on five-week-old birds may not be enough. You would be right in terms of a ten-minute timer, but what if the fan were running off a three minute timer? One minute out of three is about the same as three minutes out of ten. At the present time, we don't use three minute timers, but we may in the future.

Some growers have expressed concern about five-minute timers because of a perception about increased electricity usage due to the increased number of fan starts each hour. Tests conducted by a major fan motor manufacturer have shown that operating a fan off a timer does not have a great effect on electricity consumption. For instance, if you ran two 36" fans one minute out of five it would cost you approximately 40 cents a day. If you ran those same two fans constantly for four hours and 48 minutes (the same as one minute out of five for twenty-four hours) it would cost approximately 38 cents a day. Not much of a difference.

One of the keys in producing a quality bird is maintaining a consistent environment. A five-minute timer will keep temperature and air quality fluctuations to a minimum while at the same time keeping your heating costs to a minimum. Not very often can a grower do something at minimal cost that helps him to produce a better bird and reduce operating costs. If you are building a new house or if your old ten-minute timers are getting old you may want to take a serious look at installing five-minute timers.

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