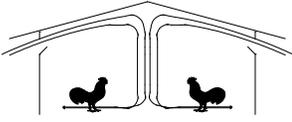




The University of Georgia

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Cooperative Extension



Poultry Housing Tips

Is Your Water System Designed for Peak Demand?

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Water availability is an increasingly common problem on a number of broiler farms during hot weather. The biggest contributor to this situation is the increasing use of evaporative cooling pads. The typical six-inch evaporative cooling pad system can, at times, use 20% more water than a fogging pad system and four times the water of a traditional interior fogging system. But, an interesting fact is that over the course of a day the evaporative cooling system typically uses less water than the birds drink. Even on a hot and dry day the evaporative cooling system may use only a little more water than the birds. So how can a simple doubling of water usage cause problems on so many farms? The answer lies in the fact that it is not the total amount of water the evaporative cooling system uses but rather the short term demands that pad systems can place on a farm's water system that can prove problematic.

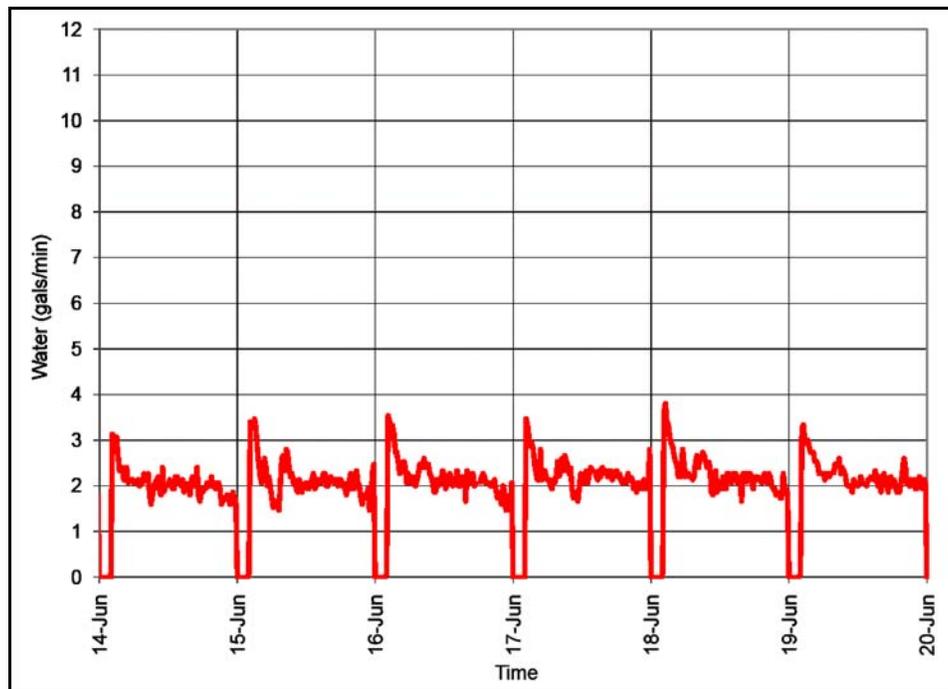


Figure 1. Seven-week-old broiler water consumption in a 50' X 560' house.

Figure 1 illustrates the water consumption rate of approximately 32,000 seven-week-old broilers (50' X 560' house). There is a peak water flow rate of three to four gals/min when the lights first come on in the morning and the birds begin to eat. The flow rate drops to zero at midnight when the lights go off for a couple of hours. Other than these two relatively short periods, the flow rate tends to be a fairly consistent two and two and a half gallons per minute. From a water system design perspective a flow rate of two gallons per minute is not very high. In fact, the typical bathroom sink faucet has a flow rate of one to two

gallons per minute. This relatively minimal flow rate doesn't require much of a pipe running from the street or the well to the house. In fact, based on general pipe sizing guidelines (*Poultry Housing Tips* - May, 2007) a single 3/4" pvc pipe would prove more than sufficient to deliver this amount of water to a house with 32,000 seven-week-old birds (Table 1).

General Pipe Sizing Guidelines	
Flow Rate	Pipe Size
5 gals/min or less	3/4"
10 gals/min or less	1"
20 gals/min or less	1 1/2"
40 gals/min or less	2"
60 gals/min or less	2 1/2"
80 gals/min or less	3"

Table 1. General pipe sizing guidelines

As noted previously the challenge facing many producers when it comes to supplying sufficient water to their houses during hot weather is due to the relatively short term demands their houses's evaporative cooling pad systems can place on their farm's water delivery system. Though an evaporative cooling pad system can use the same or less water over the course of a day than the birds, it will use it over a much shorter period (ie., 10 a.m. to 10 p.m.). Furthermore, over the course of the day the amount of water used changes dramatically as the number of fans operating increases and as outside temperatures increase and relative humidity decreases. This fact can result in the evaporative cooling system using, at times, five times or more water than the birds (Figure 2).

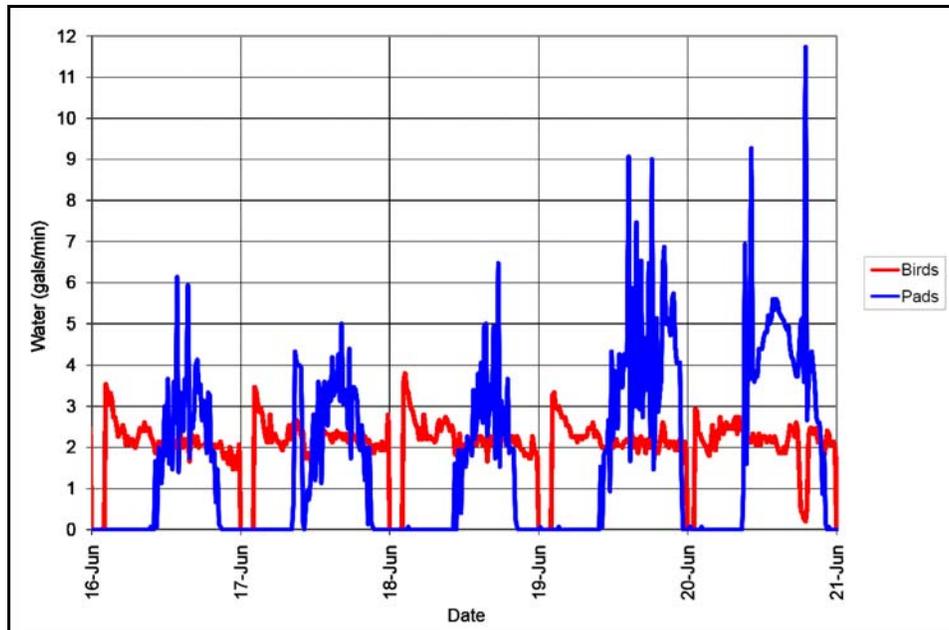


Figure 2. Broiler and evaporative cooling pad water usage (gals/min).

To avoid problems, a house's water supply system must be designed based on its peak water usage (i.e., market age birds, all the fans operating, hot and dry weather) and not a daily average. Figure 2 illustrates water usage rates for both the birds and the evaporative cooling system over a five day period. Whereas bird water consumption remained fairly consistent over the five day period, the evaporative cooling system used as little as one gallon per minute in the mornings and had peaks over 10 gallons per minute in the afternoon. For the time period illustrated, though a 3/4" pvc pipe would have been adequate to

supply water to the birds it would take a 1 ½" pipe to supply enough water for the birds and the evaporative cooling system, as well as a water source capable of supplying nearly 15 gallons per minute of peak capacity for this single house (Table 1).

What happens if you don't have a water supply system capable of supplying enough water to meet the high peak demand of an evaporative cooling system is illustrated in Figure 2. On the afternoon of June 20th there was a sudden increase in water usage by the evaporative cooling system followed by a sudden drop in bird water consumption. Basically there simply was not enough water to supply the birds and the house's evaporative cooling system. In an effort to get by, the producer restricted the amount of water flowing to the evaporative cooling system. Though this increased the water flow to the birds, it resulted in an increase in house temperature (Figure 3).

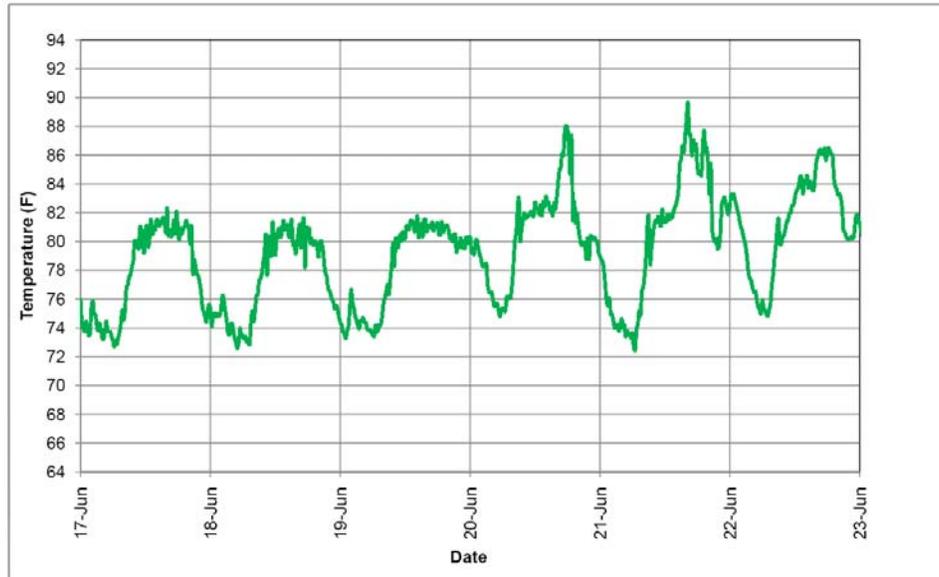


Figure 3. Average house temperature during a summer flock.

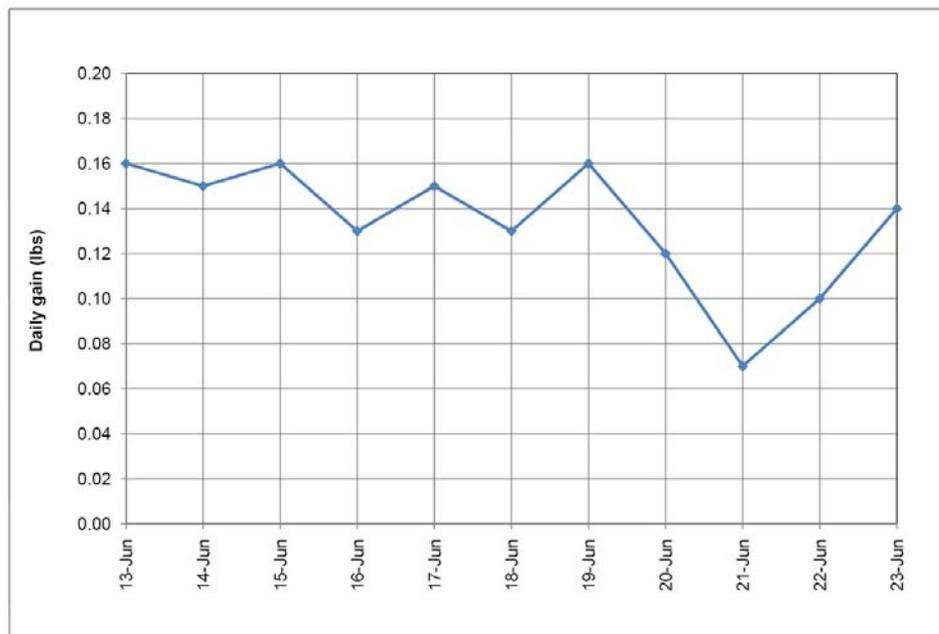


Figure 4. Daily rate of gain during a summer flock.

Though restricting water flow to a house's evaporative cooling pads is a logical stop gap measure, it is important to realize that birds do not respond well to sudden changes to temperature. Figure 4 shows the daily weight gain of the birds in the house. The increase in afternoon house temperature resulted in a significant decrease in daily rate of gain for a two day period which appeared to rebound on the third day even though temperatures were still higher than they were the days prior to when

the water supply problems were encountered. The rebound in weight gains is likely due to the fact that the birds became accustomed to the elevated afternoon temperatures. It is important to note that the house illustrated in this example had a tunnel velocity of between 550 and 600 ft/min. At this high air velocity an air temperature in the mid eighties would not be typically viewed as stressful. The problem was the sudden change in environmental conditions.

This same phenomena can be seen on another farm growing a four pound bird during a late spring flock. Average house temperatures were running in the mid seventies towards the beginning of the last week of the flock and the daily rate of gain was approximately 0.20 lbs. The weather changed and house temperatures climbed into the low eighties for a couple of days. Though air temperatures in the low eighties in a modern tunnel house should not be a problem, especially for a four pound bird, the relatively sudden change in house temperature resulted in a reduction in daily rate of gain of approximately 25%.

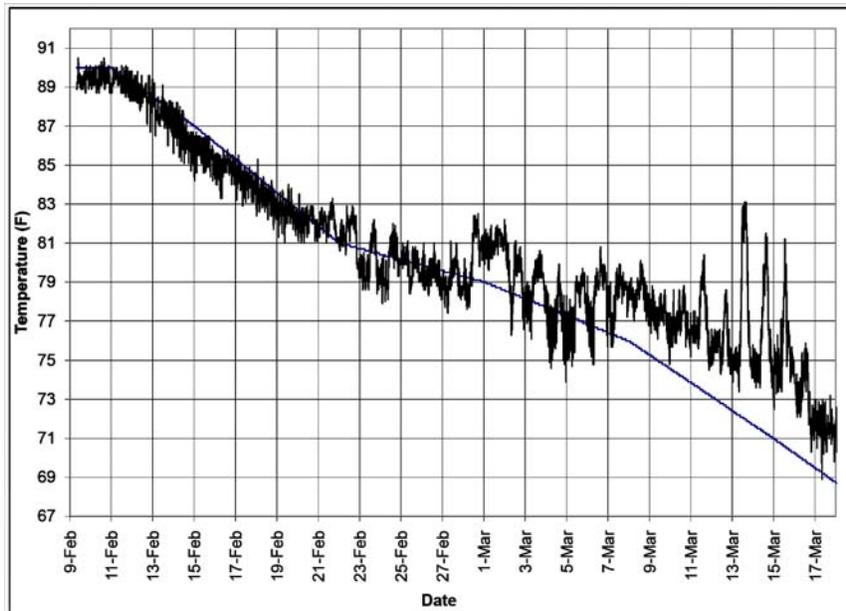


Figure 5. Average house temperature during an early spring flock.



Figure 6. Daily rate of gain during an early spring flock.

The point is that you don't have to have a total water system failure to cause significant production problems. Relatively short periods of high water demand by a house's evaporative cooling system that are not met may not only result in restricted water flow to the birds for drinking but can also lead to elevated house temperatures, either one of which can have an adverse effect on bird performance.

Birds desire consistency when it comes to water availability and house temperatures. We have to make sure that a farm's water supply system is designed to supply sufficient water not for the average day but rather for those few hours on hot, dry afternoons when we have all our fans running and we have market age birds. Because it is these days that not having sufficient water to keep our birds cool and hydrated that can prove very costly. Guidelines on suggested water system supply capacity as well as pipe sizing recommendations can be found in the May 2007 issue of *Poultry Housing Tips*.



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