

Poultry Housing Tips

Evaporative Cooling Pad Water Usage Chart

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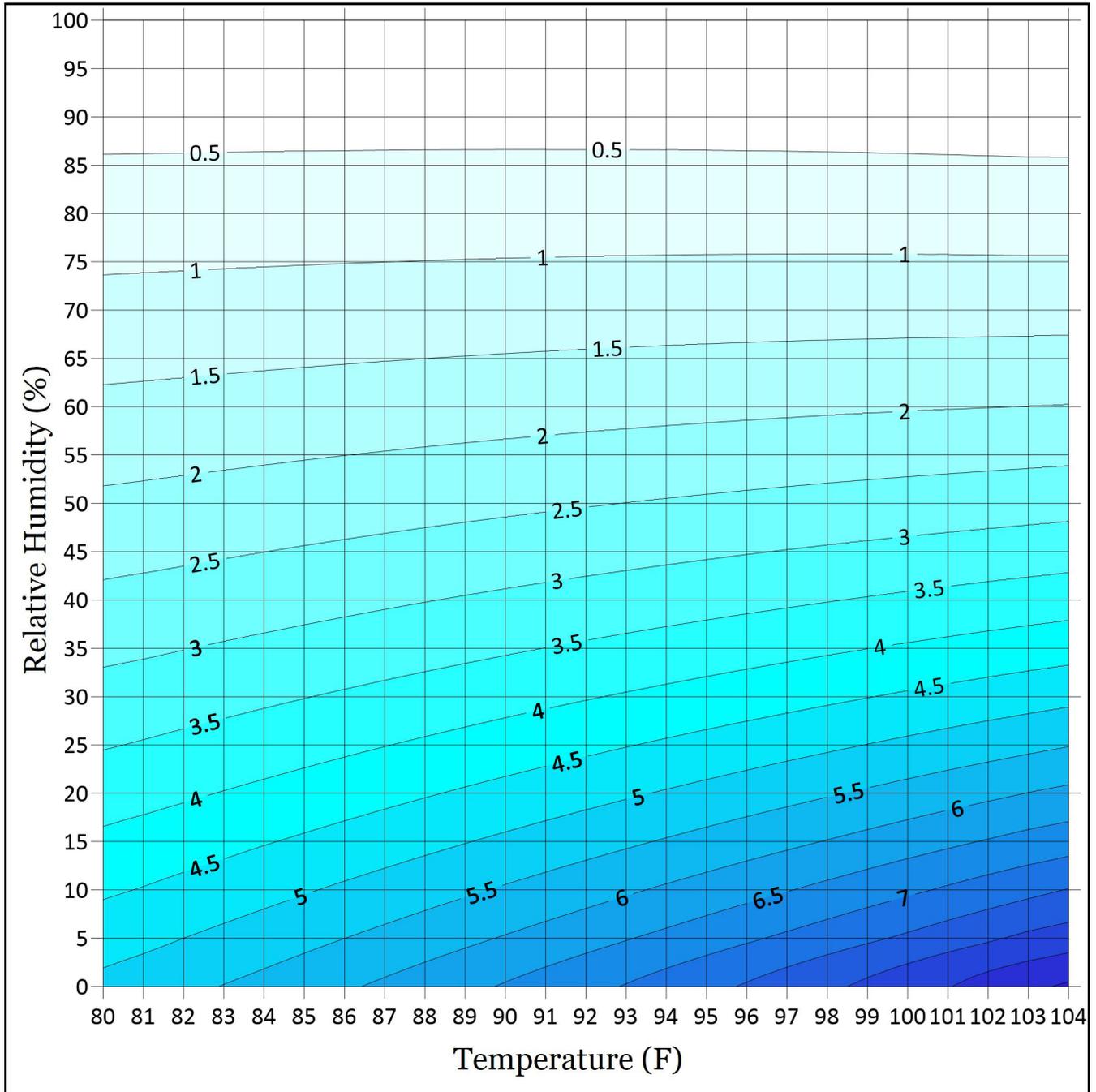


Figure 1. Water usage (gallons per min, per 100,000 cfm of operating tunnel fan capacity) for a properly wetted, six-inch, paper evaporative cooling pad (45X15) as a function of outside temperature and relative humidity

Figure 1 illustrates the amount of water which will evaporate from properly wetted, six-inch paper evaporative cooling pad system, as a function of outside temperature and relative humidity. The amount of water evaporated is provided in terms of gallons per minute per 100,000 cfm of operating tunnel fan capacity. For example, if a house had 100,000 cfm of tunnel fan capacity and the outside temperature were 90°F with a relative humidity 60%, approximately 1.75 gallons of water would evaporate from the house's pad system each minute. If the house had 200,000 cfm of tunnel fan capacity, 3.5 gals of water [2 (100,000 cfm) X 1.75 gals/min] would evaporate from the pads each minute. If the outside relative humidity were lower (20% vs 60%), the amount of cooling produced by the pads would increase from 9°F to 20°F (*Poultry Housing Tips*. Volume 34 Number 10. Evaporative Cooling Pad Performance Charts) and in turn, water usage would increase roughly proportionally from 3.5 to 8.8 gallons per minute [2 (100,000 cfm) x 4.4 gals/min].

The precise amount of cooling, and therefore water usage, produced by any evaporative cooling pad will vary with how thoroughly a pad is wetted as well as its age. If significant portions of the pad are dry, the cooling produced will be lower and, in turn, water usage will be lower. As pads get older, dirt, small feathers, and minerals collecting on pad surfaces tend to increase the surface area of the pad, resulting in slightly increased cooling and therefore a slight increase in pad water usage.

Though the chart was developed assuming that all a house's tunnel fans are operating and the house's evaporative cooling pad area is properly sized (one square foot of pad per 350 cfm of tunnel fan capacity), interestingly, operating a fraction of a house's tunnel fan capacity wouldn't significantly increase the amount of cooling produced by a pad system and therefore the predicted water usage from the Figure 1 remains accurate. For instance, if a house has enough evaporative cooling pad for ten fans (200,000 cfm) and only seven are operating, (140,000 cfm) even though the incoming air would move more slowly through the pads, the amount of cooling produced by the pad system would only increase by less than a half a degree and as a result water usage per 100,000 cfm would not increase significantly.

The relationship between the amount of cooling

produced by an evaporative cooling system and the resulting water usage is very predictable. **For every one degree of cooling produced, approximately 0.3 gals/min will evaporate from a house's evaporative cooling pads for every 100,000 cfm of operating tunnel fan capacity.** For example, if a house has 300,000 cfm of tunnel fan capacity and the pad system is producing 20°F cooling, approximately 18 gals/min will evaporate from the pads each minute [0.3 gals/min X 20°F X 3 (100,000 cfm)]. More cooling, more water. Less cooling, less water.

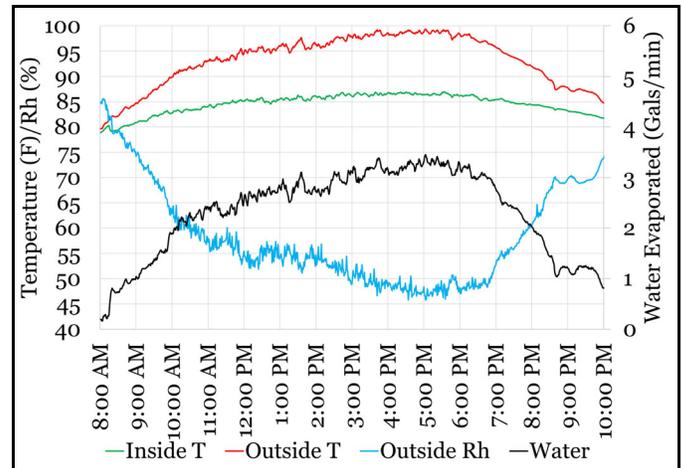


Figure 2. Amount of water evaporated from a house's evaporative cooling pads with 100,000 cfm of tunnel fan capacity over the course of day

Pad system water usage will vary significantly throughout the day because the outside temperature and relative humidity will vary throughout the day. As the outside temperature increases, the relative humidity decreases and the amount of cooling produced by a pad system increases, which means more water will evaporate from the pads (Figure 2). As a result, it's not uncommon for the amount of water used by a pad system to change three- to five-fold over the course of the day. If the number fans operating changes over the course of the day, the variation in water usage will be even greater.

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