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When it Comes to Broiler Cooling: Sprinklers Deliver Results and Save Water

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In today's world of animal welfare, stewardship and resource conservation, water supply on the poultry farm has been gaining increased attention. Farms have increased sizes, higher drinking demand from continuous genetic improvement, and higher cooling demand to maintain bird comfort during heat stress. Today's state of the art poultry houses rely on tunnel ventilation systems with large fans and evaporative cooling pads to mitigate heat stress.

Fogging systems have traditionally been installed to supplement the cooling pad system. Unfortunately, over the past 10 years, many people have mistaken these **fogging** systems with sprinkler systems. Using a booster pump, fogging systems atomize the water creating a fine mist to cool the microclimate surrounding the birds inside the poultry houses. They are activated after the cool cells, but with mixed results, since they further increase the already high humidity level, thus hindering the birds to cool themselves by heat removal from the respiratory system through panting.

- Sprinklers must not be mistaken for foggers

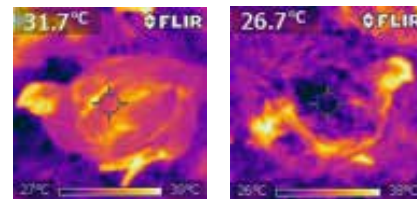
Sprinklers are not foggers or misters. They operate on normal line pressure of 50 psi. Sprinklers abandon the idea of cooling the air of the chicken house, but rather directly cool the chickens by turning them into the evaporative cooling pads. Sprinkler systems provide "Artificial Sweating" for the birds for a short duration, they then turn off, and let the fans dry off that water. To put it in simple terms, the high wind speed across chickens' moist surface feels like a breeze blowing against one's wet skin (wind chill) on a 100°F summer afternoon.

- How do the sprinklers cool the chickens?

Sprinkler systems intermittently put out water based on a time clock on the controller, similar to a minimum ventilation timer. Cooling can start with a 20 second duration, equivalent to 10 oz (~1 cup) of water covering 450 -500 sq. ft. One complete cycle of sprinkling will provide one 5 gallon pail of water in 25,000 sq. ft., operating every 30 minutes as temperature climbs during morning hours, to as frequent as every 5 minutes during severe heat stress. Controllers ramp up sprinkler rates based on age of birds to accommodate the increased demands of heat production as birds grow. This ensures precise and more efficient use of the cooling water.

- What's been observed on the birds?

The thermal images below show the effect on the chicken feathers immediately before (left) and after (right) sprinkler operation. The wet surface showed lower surface temperature (80.1°F or 26.7°C in B) than the dry surface (89.1°F or 31.7°C in A).



- How does a sprinkler system save a grower water?

Unlike cool cells, sprinkler water use is dependent on bird age. Because a sprinkler system is not attempting to cool the entire house, which typically has less than a minute of air exchange rate, cooling water usage is significantly reduced. The phase change from liquid to water vapor taking place on the bird surface is much more efficient (substantial heat loss with a small amount of water) than the convective heat transfer between chickens to the slightly less warm surrounding environment.

- How does a grower make sprinklers an integral part of reducing heat stress?

As a grower, you have to be open-minded and willing to re-think the process of bird cooling. Sprinklers take some getting-used-to and offer a totally different method of cooling broilers. You must allow the house with sprinklers to operate at higher temperatures than using cool cells only. A potential problem in the field is to run sprinklers without making any change to the cool cell setting. This not only offers minimal cooling to birds, but also the risk of getting the litter wet. Your sprinkler system should be used as the first two or three stages of cooling, with delayed onset of wetting the cool cell pads. This is done by raising the tunnel differential temperature on the environmental controller by several degrees.

In summary, overhead sprinklers in broiler houses used in combination with tunnel ventilation systems can successfully cool birds, maintain performance, and conserve substantial amount of water. Sprinkler use requires an open mind and a different thought process when it comes to cooling birds. The house temperature will be hotter, but the humidity level will be lower, helping to remove heat from the birds' respiratory system and offering a better chance for moisture removal from the litter. This will lead to drier litter and better animal welfare conditions for the chickens.