

Ventilation Strategies to Optimize Cow Cooling

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The impacts of heat stress on cow health, fertility, and performance are well recognized. As summers get hotter and longer, farmers are implementing proven heat abatement strategies to keep cows cool with the goal of improving air quality and promoting heat dissipation. Cows are susceptible to a combination of heat and humidity, so to account for both, the Temperature Humidity Index (THI) is used as a threshold for when cow cooling systems are activated. Cow behavior and performance are impacted at about a THI of 68, at which point we see a noticeable shift in increased respiration rates and body temperature as well as a decrease in milk production. In climates such as Cape Town and Riverdale where at least 35% of the year is at or above a THI of 68, mitigating heat stress is essential.

The tell-tale signs of heat stress to look for in a dairy's records are a reduction in milk production of more than 2 kg per cow per day during warm periods, a decline in conception rate by 5 points or more in the summer, an increase in lameness due to sole ulcers spiking in early fall about two months after the onset of heat stress, and behavioral changes such as bunching. Any of these signs indicate a heat stress problem.

Cows lose heat through sensible and latent heat mechanisms. Sensible heat loss occurs without a phase change, such as the movement of air over the skin, breathing in cool air, and cooling by contact with a cold surface. Latent heat loss occurs with a phase change, such as the evaporation of sweat and thermal panting. As ambient temperature approaches body temperature, latent heat loss becomes more important than sensible loss. An effective barn ventilation system must accommodate both sensible and latent heat transfer, and the system must impact the microclimate of the cow's resting area with a focus on removing accumulated heat and keeping cows resting for longer periods.

One of the best ways to keep cows cool and lying down is to provide fast moving air speeds of 1-2 m/s to as many cows as possible through the use of fans. Fans should be appropriately spaced and angled over stalls so that 1-2 m/s air speeds are achieved in at least 90% of stalls at 0.5 m above the stall surface. Milking center holding areas are also an ideal place to combine fast moving air with soaking systems to optimize cow cooling during a time when cows are more susceptible to heat stress. In these situations, the goal is to provide air speeds of 2 m/s at all of the cows' backs starting at 18 degrees C and activate soakers at 21 degrees C to run for 1 minute every 5 minutes or 2 minutes for every 10 minutes. Adding fans and soaking is on top of providing the basic necessities of shade and access to drinking water.