Survivinging the heat!

It is known that the bird's body temperature is about 40°C-41°C. To maintain the optimal body temperature, birds' heat production and heat lost need to be balanced. As the bird is continually producing heat, if heat loads are not taken away, the body temperature will be increased. In this situation, we as human being have sweating glands to get rid of high body temperature. Sweating is not an option for birds, therefore it is critical to have effective systems and proper management to help the birds to survive the heat.

In normal condition, about 75% of heat generated by the bird is lost through radiation, conduction and convection from their body, and 25% through respiration We might see the bird's response to the temperature as they will be searching for cooler places, digging in the litter and dropping and spreading wings. However when the birds experience temperatures above their comfort zone, they will turn to evaporative cooling mechanism by open mouth breathing or panting. To cool down their body, the birds may increase respiration rate from 25 to 250 inhalations per min (panting). An increase in rate of respiration means increased loss of CO_2 from lungs and air sac, which results in a low CO_2 level in the blood. The blood plasma will become more alkaline (higher pH) which influences their calcium uptake. The flocks that experience heat stress normally will have problems with low feed intake, low egg production, poor egg shell quality, high mortality etc.

Traditionally it is avoided to have breeder operations in the hot climate areas because of the mentioned problems. Fortunately knowledge and technology nowadays provide us with options to deal with this problem. We can increase the heat loss of the birds with higher air velocity or by lowering the air temperature by evaporative cooling systems. Especially when we increase the air velocity with tunnel ventilation, we can use evaporative cooling to bring down the temperature of the incoming air. This helps us to manage better in these warm conditions. Normal ventilation moves air through the house to take away heat from the birds. With tunnel ventilation, we bring up the air velocity over the birds. With evaporative cooling systems, the expired air in the house is replaced with air that passes cooling pads, and therefore has a lower temperature. Water that evaporates from the cooling pads creates a cooling effect on the hot air which flows through the pad cells. A combination of good (tunnel) ventilation and evaporative cooling can help the birds to get rid of the heat effectively.

The evaporative cooling system is normally set to work automatically based on changes of temperature. Generally fans will run first till their maximum, and then the cooling pad will be put on. The point to benefit from turning on cooling pad is when outside air temperature is about 28-29 ◦C. During the period when outside air is hot and low in humidity, the evaporative cooling system works effectively, and we can utilize the evaporative cooling system to its maximum. Problems occur when using the evaporative cooling system in hot and humid climate conditions. When the humidity is high, the evaporation of water by the system and with it the cooling effect will be limited. When the temperature is high, birds are panting to evaporate water and to cool themselves. When the air in the house is humid, it cannot absorb as much moisture from the lungs to create evaporative cooling mechanism; consequently the bird must pant faster. With both high temperature and humidity, the birds may not be able to pant fast enough to remove the heat from their body and the birds will be under heat stress.

With hot and humid climate condition, we have to be careful with running the cool pads continuously. We want to cool the birds with maximum air velocity so maximum fan speed, but running cooling pad continuously will eventually create problem with humidity in the houses. The highest risk may occur during night time where outside temperature is cooling down and ventilation is at its minimum. When the cooling pads are then still running, it can prevent the litter to dry-up and ammonia production will go up. We have to be careful not let ventilation rate drop at early evening when temperature decreases. Remaining ventilation at high level will allow the birds to dissipate the residual heat during the day. The evaporative cooling should be used sparingly with close monitor and manual adjustments or timer control. As climatic condition might changes drastically for this type of tropical climate, prompt adjustment of the control points is critical.

In the hot and humid climate condition, the evaporative cooling is an effective system to keep the birds at optimal temperature. To maximize the system's effectiveness we have to realize the principle of the system and use it rationally to have better adjustment for ventilation and cooling during certain conditions. For birds, this will help them to survive the heat and give us good performances.