



## Advice on Reducing Heat Stress in Poultry

"Under conditions of severe heat stress, poultry will have a reduced growth rate, decreased feed intake, poor feed conversion, decreased egg production, reduced hatchability rate, reduced egg shell quality, reduced egg size and reduced internal egg quality," Michael Lavergne of the LSU AgCenter, in Baton Rouge, LA. explained. "Additionally, heat stress can cause increased mortality."

All types and ages of poultry are susceptible to heat stress, but older poultry face a bigger risk. As poultry get older, they increase in size as well as insulation (feathering). Lavergne says this makes it harder for them to dissipate heat.

"The most obvious sign of heat stress in poultry is panting," the LSU AgCenter specialist says. "Poultry do not have sweat glands that can cool their skin, so instead they must use evaporation from their throat and respiratory system as a means of cooling themselves."

Lavergne points out that panting takes a lot of energy which, in turn, generates an appreciable amount of body heat for poultry.

"Ultimately, if poultry are not relieved of heat stress, their body temperature can continue to rise and increase the possibility of mortality," she stresses, "Fortunately there are several things you can do to help your home poultry flock handle heat stress."

- Provide cool, clean, quality drinking water to your poultry. Water must be available at all times and must be in a location that is easily accessible to your poultry. Water will help keep your birds cool.
- Provide a comfortable environment for your poultry. Always make sure your poultry are in a well-ventilated area in which there is nothing to obstruct the airflow. Placing poultry in a well-ventilated area will help reduce the incidence of heat stress. In addition, a misting/fogging system can be used in a well-ventilated area to help the birds cool themselves.
- Provide feed during the coolest part of the day. Poultry produce heat during the process of digestion, and when this heat is combined with the significant rise in body temperature that occurs during the late afternoon of a hot day, there is a greater risk of heat stress for poultry.
- Supplement drinking water with electrolytes. During true heat stress, the electrolyte balance in birds is altered as a result of panting. The addition of electrolytes to the drinking water will help balance the electrolytes in the birds and increase the birds' water intake. The increased water intake will aid in cooling the birds and will improve the evaporative cooling of the birds. However, you should consult your veterinarian before using any heat stress supplements such as electrolytes.
- Avoid overcrowding your poultry. You should reduce the number of birds kept in a house or in an area. Birds produce body heat. Thus, by reducing the number of birds in a house you will reduce the amount of body heat produced in the house.
- Avoid excessive activity during the hottest part of the day. The hot weather is a great stress on the birds, so avoid bothering and disturbing the birds during periods of peak heat.



"The heat of the summertime is unavoidable," Lavergne said. "However, by recognizing the signs of heat stress and taking steps to prevent heat stress in your home poultry flock, you can help keep your poultry comfortable and productive during the summertime."

## Hot Weather Management of Poultry

Hot weather can have a severe impact on poultry performance. Production efficiency can be affected long before the temperature reaches a level at which survival becomes a concern. **Table 1** is a general guide to the reaction of adult poultry to various temperatures. Heat stress begins when the ambient temperature climbs above 80°F and is readily apparent above 85°F. When a bird begins to pant, physiological changes have already started within its body to dissipate excess heat. Even before the bird reaches this point, anything that you do to help birds remain comfortable will help maintain optimum growth rates, hatchability, egg size, egg shell quality, and egg production.

**Table 1. Heat Stress & Ambient Temperature**

55° to 75°F	Thermal neutral zone. The temperature range in which the bird does not need to alter its basic metabolic rate or behavior to maintain its body temperature.
65° to 75°F	Ideal temperature range.
75° to 85°F	A slight reduction in feed consumption can be expected, but if nutrient intake is adequate, production efficiency is good. Egg size may be reduced and shell quality may suffer as temperatures reach the top of this range.
85° to 90°F	Feed consumption falls further. Weight gains are lower. Egg size and shell quality deteriorate. Egg production usually suffers. Cooling procedures should be started before this temperature range is reached.
90° to 95°F	Feed consumption continues to drop. There is some danger of heat prostration among layers, especially the heavier birds and those in full production. At these temperatures, cooling procedures must be carried out.
95° to 100°F	Heat prostration is probable. Emergency measures may be needed. Egg production and feed consumption are severely reduced. Water consumption is very high.
Over 100°F	Emergency measures are needed to cool birds. Survival is the concern at these temperatures.



## Methods of Heat Loss

During the summer months, when daily temperatures regularly reach the mid- to upper 90s, it becomes critical for the birds to dissipate body heat to the surrounding environment. Poultry do not sweat and therefore must dissipate heat in other ways to maintain their body temperature at approximately 105°F. Body heat is dissipated to the surrounding environment through radiation, conduction, convection, and evaporation (**Table 2**). The first three avenues are known as *sensible heat loss*; these methods are effective when the environmental temperature is below or within the thermal neutral zone of the bird (55° to 75°F) (**Figure 1**). The proportion of heat lost through radiation, conduction, and convection depends upon the temperature difference between the bird and its environment. The bird loses heat from surfaces such as wattles, shanks, and unfeathered areas under wings. To maintain body temperature by sensible heat loss, the bird does not need to drastically alter its normal behavioral patterns, feed intake, or metabolism. The purpose of poultry house ventilation is to maintain a high enough air velocity or a low enough temperature in the house that the birds can maintain body temperature by sensible heat loss.

**Table 2. Methods of Sensible and Latent Body Heat Loss**

Heat Loss Method	Direction of Heat Flow
<i>Definition</i>	
<b>Sensible Heat Loss Methods</b>	
Radiation	
<i>Flow of thermal energy without the aid of a material medium between two surfaces</i>	All surfaces radiate heat and receive radiation back; <b>the net radiation heat flow is from higher to lower temperature surfaces.</b>
Conduction	
<i>Thermal energy flow through a medium or between objects in physical contact.</i>	Direction of energy transfer depends on a temperature gradient; <b>heat moves from areas of higher to lower temperature.</b>
Convection	
<i>Heat flow through a fluid medium such as air; thermal energy moves by conduction between a solid surface and the layer of air next to the surface, and the thermal energy is carried away by</i>	Energy transfer to the air depends on temperature and movement of air across the skin surface; <b>heat is transferred to air moving across the skin surface if the air is at a lower temperature than the skin.</b>



the flow of air over the surface.

## Latent Heat Loss Method

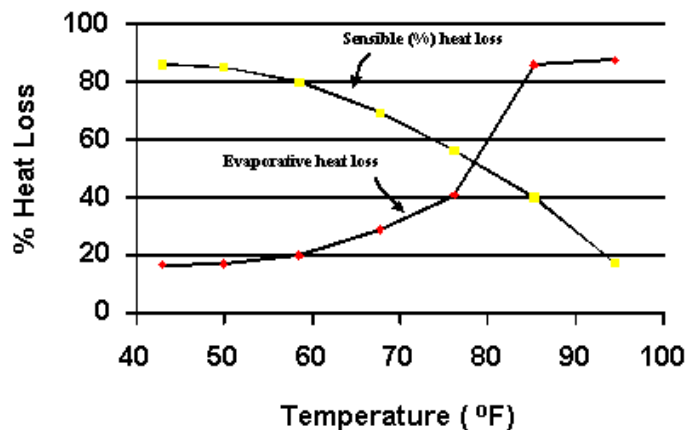
### Evaporation

The transfer of heat when a liquid is converted to a gas; when water is converted from a liquid to a vapor, heat is utilized.

Energy transfer is influenced by the relative humidity, temperature, and air movement; **heat is transferred from the animal's body to water, turning it to water vapor.**

Once the environmental temperature reaches approximately 77°F, the method of heat loss begins shifting from sensible to *evaporative heat loss*, as shown in **Figure 1**. Dissipation of body heat by the evaporative process requires the bird to expend energy by panting (hyperventilation), which begins to occur at about 80°F.

**Figure 1. Method of heat loss from birds as temperature changes.**



## Energy Seal Coatings

Energy Seal Coating can reflect up to 90% of the heat energy of the sun from a roof surface. The temperature reduction can and will have a significant effect on reducing interior temperatures. The use of our roof coatings on a poultry house can be a significant part of reducing or eliminating heat related stress, mortality and improved feed conversion.

**All of which will make each flock more profitable for the grower!**