

# IMPACT OF HEAT STRESS ON POULTRY

*One of the Most Important Challenges to Production Worldwide*

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## SUMMARY

Heat stress is one of the most important stressors in poultry production. It results in estimated annual economic losses of \$128 to 165 million to the poultry industry in the US alone and has become a point of interest from a welfare standpoint, particularly due to increased public awareness and concerns.

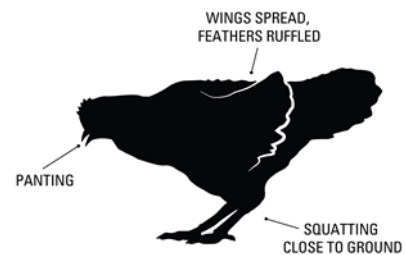
## HEAT STRESS

Heat stress is a condition that occurs with elevated heat and humidity. It results when there is an imbalance between the energy leaving the bird and the amount of energy being produced by the bird. Heat stress has negative effects on all areas of poultry production but is especially detrimental to fast growing broilers. Pre-disposing factors to heat stress include genetics, feather cover, age, poor ventilation and high stocking densities. At temperatures above 30°C (>86°F) birds begin to experience the signs of heat stress.

## HEAT STRESS EFFECTS ON PRODUCTION

- Panting
- Wings spread; feathers ruffled
- Squatting close to ground
- Increased water consumption
- Decreased feed consumption
- Increased mortality
- Decreased activity

## SIGNS OF A HEAT STRESSED CHICKEN



## HEAT STRESS EFFECTS ON THE ANIMAL

Poultry seem to be particularly sensitive to heat stress. Birds lack the ability to sweat, therefore, they cool themselves by increased blood flow to the surface of their bodies or by panting. When birds pant, air-exchange is elevated and the moisture in the bird's body is evaporated at a higher rate, which can lead to dehydration. Panting requires muscle activity which generates additional heat. This expended energy can exhaust the animal physically. Increased respiration rates lead to elevated carbon dioxide levels and blood pH resulting in alkalosis. Alkalosis can cause reduced eggshell thickness and strength by affecting the bicarbonate and calcium levels necessary for egg production. When relative humidity levels reach above 70%, it is almost impossible for the birds to lose heat via panting because the moisture gradient between expired air and pen air is nearly equivalent. The energy expended during the cooling process increases levels of reactive oxygen species (ROS) throughout the bird. Increasing the levels of these free radicals to above the tissue antioxidant capacity is known as oxidative stress.



Oxidative stress results in cell wall damage and decreased cell function. It also negatively impacts the immune system, performance and meat quality.

Heat stress can also negatively impact intestinal development and function, especially the integrity of the intestinal epithelium (the lining of the gut) which acts like a barrier between the internal and external environments and is important for digestion and absorption of nutrients. Impairment in the function of this barrier can increase intestinal permeability, leading to the passage of antigens and pathogens from inside the gut into the bloodstream ('leaky gut'). This process can increase the potential for pathogen contaminated poultry products.

### HEAT STRESS EFFECTS ON PRODUCTION

Heat stress can have a large impact on poultry productivity. Estimated economical loss to the poultry industry from heat stress is \$128-\$165 million annually.

- Decreased feed intake
- Decreased feed efficiency
- Decreased body weight in growing birds
- Increased mortality rate
- Decreased breast meat and protein content with increased fat deposition
- Reduced egg production, egg weight and eggshell thickness and strength
- Negative effects on intestinal development and functions
- Negative effects on immune system efficiency

### ALLEVIATION OF HEAT STRESS

- Maximize airflow and ventilation
- Encourage water consumption
  - Provide cool, fresh water
  - Make sure water lines are clean and flushed
  - Supply additional drinkers to promote water intake
- Support gut and immune health
- Alleviation of oxidative stress

*For Ralco product recommendations see Ralco Technical Article: Heat Stress Damages Gut Health*

