# Heat Stress in Chickens

Heat stress fatalities have become an increasingly common problem in free range chickens (backyard, exhibition and commercial flocks) because of more frequent extreme heatwave events (temperatures above $36^0$C) as a result of climate change. This brochure discusses the three grades of heat stress: mild, moderate and severe, and their impact on health.

Mild heat stress may occur when temperatures remain between $30^0$C – $33^0$C for more than 3 days. At these temperatures, chickens may not show obvious signs of distress but there is often a reduction in egg production, reproductive function and digestive function - the combination of which leads to secondary vitamin A deficiency. As vitamin A liver stores drop below critical levels, thermoregulation mechanisms are impaired, which exposes these birds to the effects of moderate heat stress at temperatures between $30^0$C – $33^0$C and severe heat stress at temperatures above $33^0$C.

Moderate heat stress occurs when temperatures remain between $30^0$C – $36^0$C for more than 24 hours. Chickens will show signs of distress such as inactivity, increased thirst, decreased appetite and panting. Severe heat stress is life threatening, and signs of distress occur suddenly. It often results in death when temperatures rise rapidly from $36^0$C – $42^0$C and above. This brochure outlines our methods for reducing the impact of mild to moderate heat stress on egg production, reproductive health and wellbeing as well as providing a proven plan to limit deaths from severe heat stress during extreme heatwaves.

Treatment for any degree of heat stress is most successful when the afflicted birds are treated in the early stages. The body temperature of a healthy chicken is 41- $42^0$C. Once the body temperature rises by $4^0$C to $46^0$C chickens will die irrespective of every effort to save them. It is therefore best to initiate heat stress treatment at the first indication that the chickens' body temperature has risen above its thermo-neutral zone (the temperature range in which chickens are able to behave normally). Treatment at the first signs of heat stress will save life by preventing the rapid rise of body temperature.

**SIGNS OF HEAT STRESS**

When the body temperature of chickens rises above the thermo-neutral zone, they will try to cool themselves down by changing their normal behaviour. In the early stages of heat stress, chickens will try to cool down by first moving away from each other and towards cooler places or against cool surfaces (walls etc.). As the birds over-heat, they will show more obvious signs of heat stress including slow panting, holding wings out from the body, increased thirst, decreased food intake and inactivity in an effort to dissipate heat. Chickens may sustain slow panting as a cooling mechanism for long periods so there is usually an opportunity to help halt the heat stress process at this stage.

Physiologically, chickens will increase their water intake and reduce feed intake to lower metabolic heat production. Hormonally, the neuroendocrine system is activated, leading to increased corticosterone, and changes in thyroid hormones. For birds with mild heat stress, these hormonal changes impact egg production and predisposes to the consequences of secondary vitamin A deficiency and calcium homeostasis disruption. Importantly, these birds are most susceptible to moderate and severe heat stress because vitamin A deficiency impairs their ability to thermoregulate. They are also prone to opportunistic respiratory infections, gastro-intestinal dysfunction, soft-shelled eggs and laying problems such as cystic ovaries and uterus infections (vent gleet).

**MANAGEMENT – A Preventative Approach**

Death from severe heat stress is sudden and often occurs on the day of extreme temperatures. Therefore, our prevention strategy must be instigated before, during and after these very hot days if losses are to be avoided. A preventative approach is necessary because emergency first aid treatment is rarely successful when advanced signs of heat stress are already present. Treatment may, however, be successful when initiated during the early stages of severe heat stress.

**PREVENTATIVE STRATEGY FOR HEAT STRESS**

Start the following treatment plan the day before hot weather is forecast (temperatures above $33^0$C). Continue for one day after the heat event has passed. This plan prevents the impact of mild heat stress ($30^0$C – $33^0$C) on egg production and protects against the consequences of vitamin A deficiency and digestive dysfunction during periods of moderate heat stress ($30^0$C – $36^0$C). This plan will also limit deaths during extreme heatwaves (>$37C^0$).

1. **Add Quikgel (5ml), ZADE (0.5ml), Ioford (10mls) and Apple Cider Vinegar (20ml) into 2 litres of cool drinking water.** Apple cider vinegar is high in potassium, which is lost from the body during periods of heat stress. The potassium in the apple cider vinegar helps rehydrate by stimulating the birds to drink more. Iodine in Ioford helps counteract the impact of mild to moderate heat stress on egg production by stimulating the thyroid gland to maintain functional hormone (thyroxin) levels. ZADE is given for 1 day only to boost thermoregulation processes and protect against secondary vitamin A deficiency.
2. When temperatures are forecast to rise above $36^0$C – $42^0$C, Apple Cider Vinegar can be replaced with 5 teaspoons of Sodium bicarbonate (Bicarb Soda - baking soda) in 2 litres of drinking water. Bicarb soda helps to control heat stress acidosis.
3. Feed early morning, then remove the food so that the chickens do not eat for 6 hours before the hottest part of the day as the eating process increases body temperature.
4. Reduce the number of birds in a pen to prevent overcrowding and provide fans to improve ventilation. Separate birds into small groups. Do not pick them up but make them walk which helps them reduce their body temperature.
5. Mist spray the birds. Do not wet the roof of the coop. Fans are recommended to improve ventilation, which also helps them to reduce their body temperature.
6. Remove access to grit for 3 days to prevent over-engorging and subsequent gizzard overload.

Continue the above treatment each day for the duration of the hot spell. When cooler weather returns provide Quikgel (2ml/litres of drinking water) for a further two days. ZADE Liquid should continue for 1 day each week to maintain optimal vitamin A liver stores and thermoregulation mechanisms.

**EMERGENCY FIRST AID TREATMENT**

This treatment may be given to birds found in an advanced stage of heat stress, although the outlook for recovery is poor. The signs of advanced heat stress include fast panting, darkening of the skin and combs, obvious physical tiredness and an inability to stand.

Dunk the bird in a cold-water bath for 2 minutes. Crop needle feed with 30mls of a cool water ($15^0$C) with Quikgel (5 drops) and Bicarb soda (1/4 teaspoon = 1 gm) each 4 hours until the birds are standing. Repeat three times daily until they resume eating. Place the bird on straw in a cool, air-conditioned room with another chicken or in view or hearing range of the chicken flock for emotional stability. Provide cool drinking water with Quikgel, Apple cider vinegar and Bicarb soda (see above dosages) until the chicken is eating.