

'Heat Stress in Racing Greyhounds'

by

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Abstract

Heat related illness has been recorded in dogs undertaking strenuous exercise in high temperatures. In South Australia, summertime daily maximum temperatures may reach 50°C. This study aimed to determine if a safe maximum ambient temperature for racing in greyhounds can be established and if particular environmental or phenotypic factors increase the risk of greyhounds developing hyperthermia.

A preliminary study compared four temperature recording devices to determine their suitability for use in a racing environment. Digital rectal thermometry was the most reliable and convenient method of recording greyhounds' body temperature. An observational study was then undertaken at racetracks in South Australia, during which, environmental temperature and relative humidity were recorded and greyhounds' body temperatures measured on arrival, pre- and post-race. A mean increase of 2.1 ± 0.4 °C in greyhounds' (n=239) post-race rectal temperature was recorded. No association was found between environmental temperatures and greyhounds' temperatures on arrival or pre-race. However, post-racing there was a small but significant relationship between shade temperature and both rectal temperature ($r^2 = 0.023$, $P = 0.027$) and the increase in rectal temperature ($r^2 = 0.033$, $P = 0.007$). No association between environmental relative humidity and body temperature was detected.

The influence of sex, bodyweight and coat colour on body temperature increases were investigated. There was a small but significant relationship ($r^2 = 0.04$, $P = 0.009$) between

bodyweight and post-exercise rectal temperature. Greyhounds of dark colours developed higher temperatures than light coloured greyhounds ($P < 0.05$).

Animal housing at racetracks was examined and temperature and relative humidity levels in enclosed environments were recorded using data loggers and ibuttons. A significant relationship was found between kennel house temperatures and body temperature changes of greyhounds during racing ($r^2 = 0.03$, $P = 0.009$).

Temperature and relative humidity levels in dog transport vehicles were monitored with ibuttons when vehicles were stationary and moving in both laden and un-laden states. The effects of an air conditioning system on conditions within a vehicle were measured and responses of dog body temperatures to transport were assessed. In ambient temperatures $< 33^\circ\text{C}$ the air conditioning system maintained internal trailer temperature below 26°C . Between ambient temperatures $33\text{--}37^\circ\text{C}$, although the internal temperature in the air conditioned trailer rose above 26°C , dogs were able to maintain normal body temperature. Following journeys of approximately 50 minutes in a trailer without air conditioning, mean dog rectal temperature increased by $0.5^\circ\text{C} \pm 0.2$.

Results of these studies have identified a number of factors which may increase the risk of greyhounds developing a potentially hazardous level of hyperthermia after exercise.

Following racing in external environmental temperatures $\geq 38^\circ\text{C}$, 39% of greyhounds developed rectal temperatures $\geq 41.5^\circ\text{C}$. Large, dark coloured greyhounds are at greater risk of developing hyperthermia. Conditions within kennel houses and transport vehicles may influence dog body temperature as a kennel house temperature $\geq 27^\circ\text{C}$ and transport in temperatures $\geq 32^\circ\text{C}$ are both associated with an increase in body temperature. These

findings will be important in the development of evidence-based guidelines to protect the welfare of greyhounds racing in hot conditions in Australia and other countries.

Declaration of Originality

I declare that this work contains no material which has been accepted for the award of any degree or diploma in my name in any university or other tertiary institution and to the best of my knowledge and belief contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work, will, in the future, be used in a submission in my name for any other degree or diploma in any university or other tertiary institution, without the prior approval of the University of Adelaide.

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Glossary

Ambient temperature T_A = the air temperature of the environment.

Body temperature T_B = the temperature of the animal's body.

Core temperature T_{CORE} = the temperature of the animal's body core measured physiologically in the spinal cord and areas of the brain or by an internal device such as an ingested sensor travelling through the digestive tract or a sensor implanted within the abdomen, oesophagus or pulmonary artery

Heat strain = physiological or pathological effects resulting from heat stress

Heat stress = environmental or metabolic factors impacting on the body

Heat stroke = pathological condition occurring when the body's heat dissipating mechanisms are overwhelmed

Rectal temperature T_{re} = the temperature measured against the rectal wall.

Shade temperature = the air temperature measured outdoors in a shaded area.