

HEAT STRESS IN HORSES

When a horse is deriving energy from its food only, approximately 20% is used while the rest creates heat, which must be removed. This is not an issue at normal ambient temperatures but can be a serious problem at high levels of exercise in a hot and humid environment.

The body of the horse is 60-70% water. Cell metabolism depends on electrolytes for managing fluid balance and all metabolic processes. Electrolytes are minerals such as sodium, potassium and chloride that dissolve in body fluids and control muscle contraction, neural function and overall metabolic function. They are regulated by body systems, especially the kidneys. As summer temperatures increase the horse may absorb extra energy if the environmental temperature is greater than body temperature. The extra heat from work must be removed to prevent body core temperature from increasing, causing hyperthermia. Heat removal is accomplished by the horse sweating, and to a lesser extent through evaporation in the respiratory tract. Sweat losses can be substantial and include water and electrolytes. Equine sweat, unlike human sweat, has a higher concentration of electrolytes than blood plasma. Sensors in the horse's body do not detect a decrease in water content of plasma when sweating. There is no signalling dehydration with sweating as in humans. Sweating does not stimulate the thirst mechanism as in humans. The thirst mechanism is also blunted by hormones that are increased with the stress and excitement of exercise.

Short term exercise like racing can cause heat production and loss of body fluids and electrolytes but these can be easily replaced. In hot humid climates the heat load and loss of fluid and electrolytes with sustained lower level exercise, like endurance, can cause far larger losses leading to dehydration, and metabolic disturbances that can be fatal. Loss of body fluids and electrolytes during prolonged exercise typically exceeds replacement, even if water, other rehydration solutions and food are available.

Body water loss equals weight loss. Endurance horses may lose 2-7% of body weight, regardless of distance. They may try to continue even if dehydrated by 10%, complicating stress evaluation. Body weight loss may persist after overnight recovery. Fluid reserves (8-10% of body weight) in the large intestine may provide up to 10 liters of water and 30 grams of electrolytes normally lost in sweat. The majority of body weight loss occurs early in such events, and weight holds steady or even increases, if the horse will eat and drink on the trail. Sweat and electrolyte losses may range from 5 to 10-12 liters per hour for hot humid conditions. Horses may lose the equivalent of 235 grams of electrolytes in 2 hours of exercise. Water loss through the respiratory tract does not involve loss of electrolytes. Water and electrolytes supplied from the gut help offset sweat losses. There is no need to supply the total electrolyte loss calculated using sweat alone with added electrolytes. Horses can quickly heat up.

As sweat losses increase the horse tries to lessen the rise in body temperature by increasing heart rate and sending more blood to the skin. Horses that are dehydrated may suffer from lack of oxygen to the muscles leading the horse to start to fatigue to protect itself. Heat stress may quickly turn into heat stroke with catastrophic results.

The horse increases breathing rate to shed heat, but because breathing rate is linked to stride rate increasing respiration rate to shed heat is limited.

Sweat losses range from 5 to over 45 liters per day. This depends on the intensity and duration of exercise and ambient temperature and humidity. Sweating rates initially increase with increased heat production, but may decrease or even stop if the heat stress is too severe. In high humidity if ambient temperature is similar to body temperature, cooling mechanisms will not work. As core temperature approaches 106.9 F problems will occur. At this temperature blood flow to the gut may cease, causing gut damage and possibly colic. Blood flow to the brain decreases, and blood clots may occur. Horses quickly go from being distressed to loss of consciousness and death. Use appropriate cooling techniques until body temp is below 103.5 F.



Tips to Prevent or Reduce Heat Stress:

Fit horses start to sweat earlier, and will increase plasma volume/cardiac output by 10%, increasing the ability to shed heat. Allowing adaptation to hot conditions for two weeks will reduce heat stress during exercise. Electrolytes are not stored in the body so use them as recommended and afterwards as needed. Transport is an endurance ride so start out with an electrolyte two to three hours before loading and during transport to maximize water balance. Provide water free choice. Very cold water will reduce water intake. Maintaining a simple year round electrolyte program will pay dividends with improved health of the horse. Feeding to replace critical electrolytes lost in sweat, like Pegasus Hydra Guard Electrolytes by Otter Co-op, is part of the answer for a combination of nutrition, exercise and management.

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