Education Committee NOTES

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Effective Cooling

Horses have been known for centuries for their ability to work. The horse, as any machine that produces locomotion, uses approximately 20 percent of the energy burned to move and the remaining 80 percent of the energy burned to produce heat. Thus, a good deal of heat is a byproduct of work. The higher the work intensity, i.e., pulling, galloping, jumping or high school dressage movements, the greater the amount of heat that is produced. High intensity work can be sustained for relatively short periods of time compared with lower intensity work like walking, jogging or loping. Fit horses have the capacity to continue low intensity work literally for hours with relative ease in ideal environmental conditions.

Horses have a relatively dense muscle mass with a small ratio of skin surface to body mass when compared to humans. However, they are efficient coolers. When horses are adequately hydrated and in proper electrolyte balance, their ability to do work and cool is excellent. For the purpose of this discussion we will assume we have a fit, healthy horse that is adequately hydrated and has balanced electrolytes.

It is well-known that humans can endure sizeable exercise-induced increases in body temperature without long-term ill-effects, if the elevations in temperature are of short duration. The same appears to be true of the horse. When environmental conditions are ideal, both athletes cool effectively. However, when environmental conditions are severe, riders must become proactive in aiding the horse in cooling.

Horses cool by four mechanisms. Radiation works when the air around the horse is cooler than the horse's body temperature. Thus the heat that radiates from the horse is body surface to the air. Convection is when the air flows over the horse's body removing heat. This is the "wind chill" effect. Evaporation occurs when the water in the coat turns to gas and releases heat into the air. Conduction occurs when something cold is applied to the skin surface to reduce heat at the point of contact.

Under ideal climate conditions, horses reduce their thermoload easily. Radiation, convection and evaporation all work to naturally help the horse cool. Ideal conditions for cooling would include air temperature under 60ºF, where radiation reduces body heat, relative humidity under 60 percent, where evaporation works effectively to cool, and a breeze where convection removes heat. Not surprisingly, this weather sounds like ideal eventing weather. However, hostile climate conditions would include air temperature of 100ºF, where no radiation is possible as air temperature equals the horse's body temperature, relative humidity of 100 percent, where no evaporation is possible as the air is already saturated, and no breeze which means no convection. In this hostile situation, the horse is unable to cool itself. When air temperatures approach 100ºF, the horse's major method of cooling is through the lungs as the skin surface loses negligible heat.

There are various combinations in between. For example, if heat is high and humidity is low, cooling will not occur by convection but sweat will evaporate quickly. The application of water will allow more evaporation of heat. If humidity is high and temperature is low, evaporation will not work but, radiation will. If cold rain is added, conduction will also aid in cooling. The addition of a breeze is always useful to cooling.

The towel serves as a warm blanket impeding all four cooling mechanisms. *Diana de Rosa Photo*

How To Cool A Horse

When the horse's natural cooling mechanisms are compromised by environmental conditions, conduction and convection become the major mechanisms for effective cooling if we artificially create them. Conduction occurs when something cold is applied to the entire skin surface area to remove heat. Convection would include the addition of fans to create air flow.

To cool by conduction, copious amounts of cold water with a temperature less than 60º should be applied to the whole horse. The colder the water, the faster the reduction in temperature. Application should be continuous and should cover the entire body surface. Water will heat instantly and should be scraped off, physically removing the heat. Reapplication should be immediate. This process should be continued until the water that runs under the horse's belly is cool or until the rectal temperature is less than 101ºF. Dropping a horse's temperature even a few degrees will take a minimum of 10 minutes of aggressive cooling by four people.

Commonly seen methods that are ineffective include placing a towel over the horse's neck or hind quarters and leaving it there. Within seconds the towel removes heat and becomes warm itself and unless the towel is removed it serves as a warm blanket impeding all four cooling mechanisms. A bag of ice placed under the halter may be effective in cooling one square foot of the animal, however, it has no effect on the dozens of square feet of body surface. As the densest muscle mass of the horse is in its hind quarters and most locomotion and heat is generated there, cooling should be concentrated in this area. The larger the surface area cooled, the quicker cooling will occur.

Coolers and blankets have no constructive role to play in the rapid cooling of a horse. They may be appropriate in the winter when low air temperature and wind will make a wet horse cold. They work to impede heat loss and are not useful when the object is to reduce body temperature.

In hot and humid conditions, when rectal temperature is above 103ºF, apply large amounts of cold water all over the skin's surface by hose, towel, bucket or sponge and remove by scraper to maximally cool the horse in minimum time.

Will It Hurt My Horse?

Generations of conventional wisdom have said that putting cold water on horses will hurt them. It will result in tying-up, vasal constriction that will trap heat inside, cramps, making the horse unfit for further work, and cooling them down too much.

During the past four years, several hundred horses have been cooled during training and competition by splashing cold water all over their bodies. None have shown any effect except to cool faster. No horse has shown any clinical or physiological signs of tying-up, cramps or vasal constriction. All horses have been able to continue work without the loss of performance as a result of this cooling method. All have had their body temperature reduced in a short period of time.

When Should This Method Be Used?

Horses routinely work successfully with reduced rectal temperatures of 104º - 106º F. Temperatures rise with more work. Horses in international competition seem able to tolerate rectal temperatures in excess of 108ºF and greater without ill effect. However, these high temperatures can only be tolerated for short periods of time. Serious long-term damage will result from sustained core and brain temperatures of 108ºF. Thus, every effort must be made to cool those horses. When weather conditions impede heat loss, steps must be taken prior to the continuation of intense work to aggressively cool the horse to insure that the additional work will not add too great a thermoload. Further, the faster the horse is cooled after work, the less the risk of injury from prolonged exposure to high body temperatures. □

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