

Hydration 101: Learn to Prevent Problems

It happens innocently enough. A healthy, seemingly fit horse is participating in a distance ride or perhaps simply working cattle as part of a regular day. It has been hot all week but the horse has had access to plenty of water and even had a salt block available. The horse has been sweating heavily all morning but its owner has made sure to take numerous breaks and offered water. Even though it hasn't shown much interest in water, the owner is certain his horse will drink when it needs to so they continue to ride or work.

Meanwhile, largely unnoticed metabolic and physiologic processes are occurring that may soon lead this equine athlete into an emergency situation.

Research has shown that during a 50-mile endurance ride in ambient temperature the average horse will exert enough muscular energy and produce enough heat to melt a 150-pound block of ice and then bring it to a boil. At a temperature rise of nearly 2°F per hour (without sweating) a horse would soon reach the critical temperature of 42°C and a crisis would ensue. The need to remove this heat from the horse is crucial.

Horses lose heat through evaporative cooling utilizing sweat and through respiration—from 1.5 to 4 gallons of sweat per hour in hot strenuous work. Add slowly progressing dehydration to this picture and the athletic horse begins a dangerous process that, if not altered, may result in heat stress, heat stroke and possible death.

The horse working on a hot day in our example is beginning to become dehydrated. Usually dehydration causes the plasma sodium (Na) concentration to increase and this rise in sodium is a trigger for the thirst response in horses. However if a horse is becoming systemically dehydrated but is also sweating heavily then the overall loss of Na in the sweat may offset the drop in plasma volume and the sodium concentration may stay the same or actually increase. Horses in this situation are losing significant electrolytes and are beginning to experience hydration problems but they may not be thirsty and may not drink when water is offered.

It is important to stress to owners that all exercising horses must drink even if they seem not to be thirsty. Even though the old saying is, "You can lead a horse to water but you

can't make him drink," a good number of endurance and event riders will tell you differently. Horses that will be exercising heavily in heat and humidity must be taught to drink at every opportunity—especially during the early stages of exercise.

Hal Schott, DVM, PhD, DACVIM, and researchers at the Veterinary Medical Center at Michigan State University have shown that offering horses slightly hypertonic water (0.9NaCl) during exercise will stimulate the thirst center and will result in that horse drinking more overall water than if non-salty water had been used. Their research would also support offering exercising horses water at ambient temperature since horses in their study drank more water at room temperature than either warmer or cooler water when offered.

The consequences of not staying hydrated are far too serious not to utilize every means possible to get horses to drink.

Once dehydration begins to take place the horse's body loses the ability to sweat efficiently. Without enough sweat the horse cannot continue to utilize evaporative cooling to dissipate the heat that it is still producing. As the body dehydrates there is a loss of plasma volume so blood becomes less fluid. The cardiovascular system becomes less efficient at transporting oxygen throughout the body and it must begin to work even harder to support the working horse.

Susan Evans Garlinghouse, DVM, reported previously in EN of studies showing that a horse cantering easily at a heart rate of 130 beats per minute when fully hydrated can achieve a heart rate of up to 160 beats per minute doing the same level of athletic work when dehydrated. Thus the athletic horse must work harder when dehydrated which further increases the heat being produced and a vicious cycle gets worse. Such a horse is increasing the effort of work but functioning less efficiently.

The body responds to such a crisis situation by beginning to shunt blood from less vital organs. One of the first systems to show a reduction in blood flow is the intestinal tract. Many horses begin to experience intestinal cramps in conditions of electrolyte imbalance and dehydration;

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ileus and colic are common consequences.

Often these complications are seen at a time that can be far removed from actual work or competition. It is important that owners remember to continue supplementing their horses with electrolytes and encouraging water intake for days after heavy exercise so that the horse's body is given ample time to rebalance itself.

Recommendations for the prevention of hydration problems in performance horses are simple to give but much more difficult to encourage horse owners to follow.

- During the week before competition ensure that the horse has a high quality diet which includes added electrolytes. While electrolytes cannot be "stored" in the body, you do want to ensure that all the horse's body needs are being met and that no deficiency situation exists prior to athletic work.

- Utilizing a high fiber diet in the days prior to competition will also create a reservoir of soft, wet ingesta in the gut that can be used as a source of both water and electrolytes early in

a competition when horses normally show poor inclination to drink. Horses working at speed over short distances may not wish to carry the added weight of a large volume of wet ingesta so an alternative approach may be needed.

- There are countless formulations of electrolytes available and it may be beneficial to analyze blood samples taken before and after a hot, humid competition to determine the very best electrolyte mixture for each specific horse. During competition a dose of these electrolytes may be given orally every two hours. You may need to buffer these electrolyte mixtures since high salt formulations can be irritating to the mucosa of horses' mouths and tongues.

Keeping a horse hydrated is not exceedingly difficult and the physiology of heat stress is not difficult to follow. Yet each summer veterinarians will deal with a number of such cases. Prevention comes from education so it's important to learn the facts about heat stress, fluid loss and electrolyte replacement so you can graduate with honors from Hydration 101.

—Ken Marcella, DVM

The proper way to cool a hot horse

Many owners and trainers have never been taught how to properly cool a hot exercising horse. How hard can it be—just hose your horse down with water, right?

Actually it is very important to understand how to safely and quickly cool a hot, sweaty horse.

The 1994 FEI Samsung Equine Sports Medicine Conference in Atlanta addressed problems that were anticipated in the intense heat and humidity that was likely to occur during the 1996 Olympic Games. Research that came from that initiative showed that simply hosing off a horse did little good—it did not significantly drop the horse's temperature and may in fact have been detrimental.

Researchers showed that cool-to-cold water being poured or sprayed over a horse's skin wets the horse and the very thin layer of water actually contacting the horse's skin is superheated quickly to the horse's body temperature.

The rest of the water being sponged or dumped or sprayed on the horse merely sheets over that initial one- to two-cell water layer on the horse. The initial water actually acts like a raincoat and does not allow other water

molecules to contact and cool the skin, so the horse may in fact become hotter in the process.

The best method for cooling a horse is to spray or sponge on water with one hand and to almost immediately scrape off the now super-heated water with a sweat scraper in your other hand. "Spray, scrape, repeat" is the cooling method of choice. This means of cooling can significantly drop a horse's core temperature and requires less actual water since large volumes are not being wasted as they are usually dumped on a horse with little chance of having any effect.

The water can be fairly cold with this method of cooling because it does not stay on the horse's body long enough to cause muscle cramping which had been a previous concern when cooling horses with the application of cold water.

Increasing airflow can also help with cooling, so fans and a location with a breeze may help cool an exercising horse but researchers have shown that water is still 20 times more efficient at cooling horses.

—Ken Marcella, DVM

