You Can Lead A Horse to Water, but You Can’t Make Them Drink: Equine Electrolytes

Amy Parker, M.S.

The horse produces heat during exercise, and core body temperature can quickly increase. In an effort to dissipate the heat and maintain a normal core temperature, blood flow to the skin increases and the sweat glands are signaled to produce sweat. For the horse, sweating is the primary method of cooling. Sweating can result in significant fluid and electrolyte losses. The rate at which the horse is able to replace these losses is key to continued exercise performance and maintaining overall health.

Estimated sweat loss
Water represents approximately 65% of the horse’s total body weight, although this can vary with age, gender, health, and other factors. A common method to calculate sweat loss is based on this percentage of the total body weight loss during the exercise bout. During exercise, sweat losses can be significant enough to cause exhaustion, muscle soreness, fatigue, and dehydration. The following table provides some estimated examples of sweat losses at different exercise intensities:

<table>
<thead>
<tr>
<th>Exercise Type</th>
<th>Sweat Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Racing and race training</td>
<td>Up to 10 liters (~2.5+ gallons)</td>
</tr>
<tr>
<td>Cross country phase of a 3-day event</td>
<td>Up to 20 liters (~5+ gallons)</td>
</tr>
<tr>
<td>100-mile endurance ride</td>
<td>Up to 35 liters (~9+ gallons)</td>
</tr>
</tbody>
</table>

Sweat is not just water.
The primary component in equine sweat is water; however, other nutrients are lost as well. Equine sweat also contains proteins and minerals. The major minerals lost in equine sweat are the ionic forms of sodium (Na⁺), chloride (Cl⁻), and potassium (K⁺), and to a lesser extent calcium (Ca²⁺), and magnesium (Mg²⁺). These minerals are collectively called electrolytes. By definition, an electrolyte is any of the ions (e.g., Na⁺, Ca²⁺) that, in biological fluid, regulate or affect most metabolic processes (e.g., the flow of nutrients and fluids into and out of cells).

In a typical equine diet, protein lost in sweat should be easily replaced without additional supplementation. Electrolytes, however, can take much longer to rebound due to the concentrations lost in sweat and lack of stored electrolytes in the body. Supplementing electrolytes in the diet of an exercising horse is important in not only replacing lost electrolytes, but also in helping to rehydrate the horse. The following table shows the range of estimated electrolyte losses in equine sweat based on research with exercising horses. The ranges are mainly due to the different methods used to collect the sweat.
Estimated electrolyte concentrations in equine sweat

<table>
<thead>
<tr>
<th>Electrolytes</th>
<th>Sodium</th>
<th>Potassium</th>
<th>Chloride</th>
<th>Calcium</th>
<th>Magnesium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range in 1 L of equine sweat</td>
<td>2640 - 3800 mg</td>
<td>1100 - 2300 mg</td>
<td>4900 - 7100 mg</td>
<td>123 - 124 mg</td>
<td>52 - 56 mg</td>
</tr>
<tr>
<td>Approx. percent in equine sweat</td>
<td>~29%</td>
<td>~15.3%</td>
<td>~54.1%</td>
<td>~1.1%</td>
<td>~0.5%</td>
</tr>
</tbody>
</table>

You can lead a horse to water, but you can’t make them drink.
Maintaining electrolytes and fluid balance during exercise can be challenging because the horse’s thirst response may be decreased. Human sweat is hypotonic, such that the blood concentration of sodium increases with significant sweat loss. This stimulates a thirst response and is the reason humans can usually rehydrate by drinking lots of fluids. Equine sweat, on the other hand, is isotonic to hypertonic, depending on the amount of sweat lost. This means blood concentration of sodium may not increase. As a result, horses may not have a thirst response when sweating at very high rates.

Supplementing before and during exercise helps to replenish electrolytes as they are lost during exercise and helps to encourage drinking, thereby helping the horse to rehydrate. Horses do not store electrolytes or fluid in the body, except those carried in the digestive tract, mainly in the large intestine. (Whether the horse can mobilize water from the digestive tract for use during exercise is unclear.) Any excess electrolytes and fluid are absorbed and excreted via urine. Nevertheless, when fluid and electrolyte losses are anticipated, dietary alterations may be helpful. Increasing water intake prior to an event will make sure the horse is well hydrated. Providing electrolytes during training can help stimulate water intake and get the horse accustomed to drinking during an exercise event.

Maintaining adequate fluid and electrolyte balance during exercise has been shown to delay the onset of fatigue. During an exercise event that causes significant sweating, the horse should be provided with small amounts of electrolytes and water during breaks to help replenish stores as they are lost and prevent dehydration. Making sure the horse drinks is essential. Feeding electrolytes without adequate water intake can result in further dehydration. Conversely, providing water without electrolytes to a dehydrated horse can also create problems (e.g., decreased thirst response and increase the risk of electrolyte imbalances, neuromuscular disorders, etc.). Electrolytes should be provided for at least several days following an event. Horses experiencing significant losses (e.g., 100-mile endurance ride) may not be able to replenish lost electrolytes and fully rehydrate in one day.

Determining the need for an electrolyte
The necessity of an electrolyte supplement will depend on the amount the horse sweats. The rate of sweating and the amount of electrolytes lost (and therefore in need of replacing) depend on several factors, including the horse’s fitness level, the load being carried, intensity and duration of the exercise bout, and ambient temperature. (Note: Higher humidity can reduce the ability of sweat to evaporate, thus decreasing the ability of the horse to cool. Higher humidity does not necessarily cause the horse to sweat more.) A horse at light work (light trail ride) can likely replace lost electrolytes with a typical diet and access to salt. Horses competing in multiple events or a short term, high intensity event (e.g., multiple show jumping classes in a single day, Thoroughbred racehorse) may sweat at a moderate rate and require some electrolyte supplementation before, during and after the event. Endurance horses will likely have the highest sweat losses and require the highest amount of supplementation. These horses should receive electrolytes for several days following an event.

Why does equine sweat foam?
Equine sweat foams as a result of a protein present in the sweat called latherin. This protein is unique to equids and can also be found in equine saliva. Latherin helps to distribute sweat across the horse’s coat, thereby increasing heat loss and cooling during exercise. The concentration of latherin in equine sweat is highest in the first sweat biing produced. As the exercise bout continues, the consistency of the horse’s sweat becomes more watery, and the sweat no longer foams. Contrary to some beliefs, the presence of foamy sweat has nothing to do with the horse’s fitness level.
The form (e.g., granular, liquid, paste, etc.) in which the electrolyte is provided is not of great importance. Making sure the horse has access to water, however, is imperative. Again, the goal is to replace electrolyte losses in equine sweat and to help encourage rehydration. Many electrolyte supplements contain sugar (or flavoring agents) to help with palatability, but the goal of an electrolyte supplement is not to replace lost glucose (sugar). This will usually be accomplished with a typical diet.

An electrolyte supplement should mimic equine sweat, such that it provides the correct amount of electrolytes in the proper ratios. Human sweat and equine sweat are quite different in their concentration of nutrients; therefore, human electrolyte drinks and supplements will not adequately meet the horse’s needs. Maintaining the proper amount and balance of electrolytes is important to the horse’s overall health. If the ratio of electrolytes is not balanced, the horse could suffer further dehydration as well as tying up, synchronous diaphragmatic flutter (aka: thumps), colic, and death in extreme cases.

Summary
- Supplementing electrolytes in the diet of an exercising horse is important in not only replacing lost electrolytes, but also in helping to rehydrate the horse.
- An electrolyte supplement should be balanced to mimic equine sweat.
- If the ratio of electrolytes in relation to the others is not balanced, the horse could suffer neuromuscular disorders, as well as further dehydration.
- Amount of electrolyte supplementation required varies with duration and intensity of the exercise and the ambient temperature.

Product Focus:

McCauley's Hydrolyte

McCauley’s Hydrolyte helps horses recover following intense exercise. Hydrolyte aids in replenishing electrolytes lost due to exercise, stress, and/or environmental conditions.

- Restores the correct balance of electrolytes lost in equine sweat.
- Encourages drinking and facilitates rehydration.
- Dissolves easily in water or can be top-dressed on feed.
- Low glycemic response.
- When added to water, Hydrolyte provides a more consistent taste and smell to different water sources. (This is particularly useful when horses are temporarily relocated [e.g., shows, events, etc.].)

Available in 5 pound pails.

Guaranteed Analysis
Salt (min).................60.0%
Salt (max).................65.0%
Calcium (min).............0.5%
Calcium (max).............1.0%
Sodium (min).............21.0%
Sodium (max).............25.0%
Potassium (min).........15.0%
Magnesium (min)........0.35%
Chloride (min)..........50.0%

Ingredients
salt (sodium chloride), potassium chloride, magnesium sulfate, calcium carbonate, calcium lactate, silicon dioxide, natural and artificial flavorings.
Customer Focus: MOLLY ROSIN

McCauley Brothers continues to extend its reach in providing top quality horse feed and supplements to those within the equine industry. McCauley’s is especially proud to work with those who also aspire to become the best they can be. On this path of achieving excellence in equine nutrition, McCauley’s has been fortunate in being introduced to Molly Rosin, who agreed to represent McCauley’s as a sponsored rider. A graduate from Fresno State with a degree in Animal Sciences, with a concentration in Equine Studies, Molly is an entrepreneurial three day event rider who established Havarah Equestrian and the Minyan Syndicate. Recently, Molly took time out of her hectic schedule to answer a few questions about three day eventing and how she will achieve her ultimate goal of riding for the United States Equestrian Team (USEF) and competing in the Olympics.

Currently, Molly bases her operation in the Mid-Atlantic region in Kirkwood, PA and winters in Aiken, SC. She has 8 horses in training at the farm and travels nationwide giving clinics and lessons to other aspiring riders. Molly has always dreamed of being an advanced level three day event rider and has achieved this distinction with a Hungarian warmblood named, Havarah’s Charly. Together, Molly and Charly have traveled across the country to pursue her goals on the path to eventually riding for the USET.

One of her goals for 2010 is to compete and finish in the top three of a CCI*** event. In doing so, she anticipates making the USEF Training List and has the potential of receiving grants which will afford her the opportunity to travel internationally, gaining valuable experience in her pursuit of the Olympics. In October 2010, the Dansko Fair Hill International will take place, which is a CCI*** event that Molly has on her agenda for the year. Looking forward to 2011, Molly has her sights set on Rolex in Lexington, KY, the only CCI**** three day event in the Americas. Upon a successful finish in that competition, she may have the opportunity to qualify for the Pan Am games, a most prestigious international event.

Molly said the ideal horse sought after for three day eventing used to be speed biased in order to cover the cross country course within the time limits. That has changed over the years as the judging for dressage has become more difficult and the show jumping courses are more challenging than in the past. Molly looks for an athletic horse that possesses the intelligence to handle the discipline of dressage along with the rigors of cross country. Her ideal horse is one that is “scrappy”; that which looks forward to competition with enthusiasm, yet has the will and “where with all” to survive.

Along with a horse that looks forward to competition, Molly said that nutrition plays a key role in determining her success on the road to the Olympics. She stated that no matter how much time and effort she put into her training for competition, without a sound nutritional program, her work would fall by the wayside. She is convinced a well balanced diet with the proper vitamins and minerals is crucial for her horses to sustain enough energy to withstand the physical demands of a top level three day event. Since Molly has been feeding McCauley’s feed, she is confident the “well thought out formulas” will help her achieve the goals she has set for herself and Havarah’s Charly. Molly especially likes the freshness of the feed and was gracious with her compliments that the staff at McCauley’s are both “kind and generous” to work with in regards to achieving both her short and long term goals.

For more information about Molly, visit her website at www.mollyrosin.com.