

Electrolytes: Who Needs 'Em?

A working horse can lose more than six gallons of sweat in one hour.

By Edgar A. Ott, Ph.D

The term "Electrolytes" brings a variety of responses from horse owners. What are they? What do they do for my horse? How do I provide them? How much does my horse need? Let's examine these questions and try to reach an understanding of the importance of these nutrients.

Electro - What?

Electrolytes are the mineral elements that, when dissolved in water, become ions, which are charged particles that conduct an electric current. Electrolytes are used within the body to control pH and osmotic pressure between the cells and the interstitial fluids. Electrolytes also play an important role in muscle and nerve function. A deficiency of electrolytes can lead to poor performance and dehydration.

Water Wars

The horse's body is comprised of about 65 percent water. Some of that water is within the cells and some is outside the cells (interstitial). The average 1,100-lb. horse would have approximately 85 gallons of water; about 26 gallons are in the extracellular compartments and 10 gallons are in the plasma. The balance between the cell water and the interstitial water is controlled by the concentrations of electrolytes in each area. Potassium is the cation in the cell and sodium is the primary cation in the interstitial fluid. If the sodium in the interstitial fluid is reduced, the potassium in the cells must also be reduced or the cells will fill with water and burst. This can lead to edema, and in extreme cases, even death.

Chloride is the primary anion in the body. Calcium and magnesium are also electrolytes but are less important than the other three because their concentrations in the fluids are lower. There is a direct relationship between electrolyte concentration in the interstitial fluid and the water content of the body. Thus, as electrolyte levels in the body decrease, the animal dehydrates. And the reverse also occurs. As the body water decreases, the body electrolytes are excreted. It is important to always offer water after administering electrolytes to ensure that the horse can properly balance its water/electrolyte concentration.

Lost in the Sweat

One of the primary factors influencing body water and electrolyte loss is perspiration. Perspiration losses are influenced by environmental temperature, relative humidity and the amount of heat the animal needs to

lose. If the environmental temperature and humidity are high, the increased heat load on the animal will require that the animal perspire to maintain the desired body temperature. Heat production in the animal is directly influenced by the activity of the animal. As the animal exercises, he produces heat and must perspire to dissipate that heat.

There is a linear relationship between intensity of work and perspiration loss. Perspiration loss also results in electrolyte loss. Although the data suggests that perspiration electrolyte concentrations could vary between individuals and perhaps with time, the data of Meyer (1987) will illustrate the quantity of minerals that are lost as perspiration increases (Table 1). Five liters (1.3 gallons) of perspiration would likely match horses doing light work for an hour in the Southeast. Fluid loss can approach 15 liters (4 gallons) per hour when it is very hot. Twenty-five liters (6.6 gallons) would be likely only for horses doing intense work such as race training or endurance type activities.

How do I provide electrolytes for my horse?

Commercial feeds contain added salt, an excellent source of sodium (Na⁺) and chloride (Cl⁻). Most commercial concentrates contain 0.75 to 1.0 percent salt. If the horse is being fed 1 lb. of concentrate per 100 lbs. of bodyweight daily, the concentrate minerals will provide most if not all of the electrolytes the horse needs. For an 1100-lb horse consuming 11 lb. of concentrate, the animal would be getting 37.5 to 50 g. of salt, an amount adequate for a horse doing light work. However, if the horse is perspiring heavily, the animal will need more sodium and chloride. This can be provided by offering a free-choice salt in the stall or pasture. Working horses may need more salt than they can consume from these two sources. Electrolyte supplementation is therefore needed. Salt or mixed electrolyte products can be top-dressed on the feed, added to water used to rehydrate the horse after work, or administered via a paste. When giving electrolytes, always remember to be sure the horse also has access to clean, fresh water. Providing electrolytes in your horse's water bucket will mean providing a second bucket with fresh water to ensure that the horse can properly balance its water/electrolyte concentration.

When provided with quality feed, sufficient forage and free choice trace mineralized salt, most horses will not require additional electrolyte supplementation.

Feed concentrates also provide some potassium, and most electrolyte products contain potassium, however, the horse's major source of potassium is forage. Most hays and pasture grasses provide 1.5 to 2.3 percent potassium. Under normal circumstances, horses fed adequate amounts of forages will not need potassium supplementation. The

exception might be the horse worked intensely in hot, humid conditions. In these situations, potassium supplementation, especially after exercise, is important. Relying on the forage to meet the horse's potassium needs under these conditions is not recommended.

Endurance horses, that is, those that are in training for distance events and horses competing in three-day event activities should be given both water and electrolytes during training and competition. Most electrolyte products provide salt, potassium chloride (lite salt), calcium chloride, magnesium chloride, glucose, and perhaps some other minerals as well. The glucose is added because it improves sodium absorption and palatability.

The amount of electrolytes needed by the working horse daily will vary with the individual horse, the activity level, and the environmental conditions. Each horse owner must monitor his or her horse carefully and administer the amount that seems to suit the individual horse. Start with 50 g. of supplemental electrolytes and add increments as necessary to meet your animal's needs.