

Electrolytes for Horses

Loss of electrolytes has far-reaching consequences, impacting virtually all of the horse's body systems

Overview

Electrolytes are compounds that conduct electricity when in solution. In horses the most abundant and important electrolytes include sodium, potassium, chloride, calcium, and magnesium. When dissolved in water, they become charged particles called ions: Na⁺, K⁺, Cl⁻, Ca²⁺, and Mg²⁺. These electrolytes are involved in a variety of basic cell functions, including muscle contraction and nerve impulse transmission.¹ Loss of electrolytes and electrolyte imbalances have far-reaching consequences, impacting virtually every equine body system.²

Sixty-five percent of a horse's total body weight is water, and the average horse needs to drink 27-30 liters of water per day. In hot climates or during strenuous exercise, as many as 10-12 liters of water can be lost per hour through sweat alone.³ Electrolytes are also lost via sweating—primarily chloride, sodium, and potassium. These electrolytes must be replaced to maintain normal body functions.²⁻⁵ Loss of water during exercise and sweating is hypothesized to increase the osmolality of the blood (the concentration of solutes such as electrolytes that are dissolved in blood), triggering the "osmotic thirst stimulus" that makes horses want to drink to replenish lost fluids.

Electrolyte supplements are widely administered to athletic horses during competitions—particularly endurance horses or horses residing and performing in hot, humid environments. The goal of electrolyte supplementation is to replace electrolytes lost through sweating and thereby restore the proper balance of electrolytes in the horse's body. Research studies have shown that horses offered salt water (sodium chloride and potassium chloride) after



In moderate environmental conditions a 1,200-pound horse can lose 6-7 liters of sweat per hour. In hot, humid conditions fluid losses can reach the 15-liter mark each hour during exercise.

exercising instead of plain water will voluntarily drink more water when it is offered a few minutes later. If offered plain water initially after exercise, the osmotic thirst stimulus becomes "blunted" and the horse will not drink as much and will therefore not replace fluid or electrolytes as quickly.³

Electrolyte supplements are available as a powder (that can be mixed with water or top-dressed on grain) or as an oral paste. These supplements often also contain a variety of vitamins and amino acids, and, frequently, some form of sugar.

Why Electrolytes are Important

Electrolytes exist in a delicate balance within the body. For example, potassium ions are often found inside cells, while sodium and chloride ions are found outside cells. Therefore, maintaining these ions in the proper compartments inside and outside of the cells is essential for many basic cell functions and physiologic actions.

An example of the importance of electrolytes is in skeletal muscle contraction. Nerves transmit signals from the central nervous system to muscle cells, signaling

them to contract. When the signal reaches the muscle cells, channels in the muscle cells' membranes open and large quantities of sodium ions (Na⁺) rush into the muscle cells. This influx of Na⁺ subsequently triggers a massive release of calcium ions (Ca²⁺) from storage vats located inside the muscle cells called the sarcoplasmic reticulum. This influx of Ca²⁺ into the cells (from the storage vat) results in muscle contraction. To arrest the contraction, the sodium ions are pumped back out of the cell and the calcium ions are pumped back into the sarcoplasmic reticulum. The muscle cell is now ready to contract again once signaled by the nerve.

Muscles such as the heart, diaphragm, intestine, and skeletal muscle rely on this (or a similar) series of events to function properly.³

Losing Electrolytes

During exercise, contracting skeletal muscle cells generate large amounts of heat. Horses have several ways to dissipate heat, but the most important is evaporation of water (in sweat) from the skin. In moderate environmental conditions an average 1,200-pound horse can lose 6-7 liters of sweat per hour. In hot, humid conditions fluid losses can reach the 15-liter mark for each hour the horse is exercising.⁵

Without fluid and electrolyte replacement, horses can become dehydrated. A dehydrated horse is unable to effectively thermoregulate (maintain a normal body temperature) and is at risk for developing serious fluid and electrolyte imbalances. These imbalances can result in a variety of performance-hindering health issues, including thumps (synchronous diaphragmatic flutter), muscle cramps or exertional myopathy (tying-up), fatigue, and potentially life-threatening exhaustion. Thus, exercising

ANNE EBERHARDT

horses, particularly endurance horses, could benefit from oral supplementation of electrolytes to replace/restore fluid and electrolyte levels and stimulate drinking.

Assessing Electrolyte Needs

All horses, regardless of performance levels, require a daily sodium supplement. Horses cannot obtain enough sodium to meet their daily needs from forage or grain. Sodium can be delivered by offering a salt block or by top-dressing grain with table salt or a commercial salt preparation.

Athletic horses participating in prolonged exercise are the class most in need of electrolyte supplementation.^{4,5} Endurance and competitive trail riding horses reportedly experience the greatest loss of fluids and electrolytes within the first 20 miles of exercise. It is therefore important to supplement electrolytes early in the event and avoid dehydration.⁴

There are many electrolyte supplements to choose from and an array of "guidelines" suggesting how and when to supplement electrolytes based on perceived losses. The exact electrolyte needs of each horse will vary depending on the:

- Weather conditions (e.g., temperature, humidity);
- Fitness of your horse;
- Effort of the exercise demand based on terrain and speed;
- Duration of the event, the length of the course, and the number of consecutive days ridden;
- How well the horse drinks;
- Number of rest stops allowed for eating and drinking; and
- Condition of the horse following transport to the event.⁴

Choose supplements with little or no added sugar (e.g., dextrose) and ensure your horse has access to fresh water with no electrolytes dissolved in it.

In some long-distance events it might become necessary for a veterinarian to administer intravenous electrolytes for a faster replacement.

Supplement Safely

Electrolyte supplements are not universally formulated, which means that not all supplements are suitable for all horses (e.g., potassium-containing supplements are not recommended for horses with

HYPP, hyperkalemic periodic paralysis).

Discuss your supplement choices and supplementation goals with your veterinarian. When administering multiple supplements, which many eventing horse owners do,⁸ determine the total amount of each supplement to administer on a daily basis to ensure the horse is not receiving more than the recommended daily amount.⁷ 🐾

REFERENCES

1. Williams, C.R. The basics of equine nutrition. www.esc.rutgers.edu/publications/factsheets_nutrition/FS038.htm
2. Anon. Dehydration and Electrolyte Losses in the Sport Horse. www.tufts.edu/vet/sports/dehydration.html
3. Schott, H.C. II. Challenges of endurance exercise: hydration and electrolyte depletion. 2010 Kentucky Equine Research nutrition conference
4. Lawrence, L. Water and electrolyte balance in the exercising horse. [www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/hrs3175](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/hrs3175)
5. Loving, N.S. Electrolyte basics. www.TheHorse.com/12000
6. Geor, R. Fluids and electrolytes. www.TheHorse.com/214
7. Oke, S. Survey Finds Eventers Nutritionally Sound, but Oversupplemented. www.TheHorse.com/13314
8. Committee on Nutrient Requirements of Horses, *National Research Council Nutrient Requirements of Horses*, sixth revised edition. Washington D.C.: National Academies Press, 2007

*Authored by Stacey Oke, DVM, MSc;
reviewed by Benjamin Franklin Jr., DVM.*



SmartPaks can

simplify feeding, help ensure your horse gets the right supplements every day, arrive in just the right amount automatically each month, **make feeding foolproof**, let you keep track of your horse's supplements, keep you from running out of supplements, **eliminate scooping**, keep supplements fresh, guarantee accurate dosing, **give you more time to ride**, save you trips to the store, and **give you peace of mind**

Buckets can't

SmartPaks™ are affordable, daily dose paks of your horse's supplements and medications, labeled with his name and delivered automatically every month. To learn more, call us at 1-800-461-8898 or visit www.SmartPakEquine.com/SmartPaksCan



Supplements Simplified™