

Thumps - Synchronous Diaphragmatic Flutter

Although not considered a disease itself, Synchronous diaphragmatic flutter, or more commonly referred to as “thumps”, is a distress flag indicating electrolyte imbalances and significant fluid loss⁹. Horses that present this anomaly slightly differ in variation¹³, however, it has been pinpointed to the firing of the phrenic nerve in synchrony with atrial depolarization, causing the diaphragm to contract with each heartbeat¹¹. In simple terms, the phrenic nerve passes directly across the heart muscle as it runs to the diaphragm and provides nerve impulses for contraction of the diaphragm muscle. Excess loss of calcium and magnesium through the sweat and rising levels of lactic acid in the body sensitizes the phrenic nerve. In response to the electrical discharges of each heartbeat, the diaphragm contracts as the atrium of the heart contracts. This is visible as a twitching in the flank, or can be felt as a “thump” when a hand is placed against the flank. This is not related to respiratory movements, but occurs simultaneous with every beat of the heart⁹. In fact, low blood calcium levels are the classic abnormality associated with thumps, but it is important to check all electrolyte levels, especially magnesium, potassium, sodium and chloride¹³. Treatment and prevention of this condition has to do with maintaining good hydration and electrolyte balance¹³.

How to Avoid Dehydration & Electrolyte Imbalances

To minimize or avoid the chances of dehydration and electrolyte imbalances, many sport horse owners provide their horses with a good quality forage, balanced diet and ability to obtain clean, cool water in conjunction with an electrolyte supplement, especially during the hot summer months⁸.

Water

Water is the most important nutrient of all, and horses should have free access to clean, fresh water at all times¹. Water consumption is critical during hot months but even more so during extensive condition and training programs as well as competition. Providing an adequate supply of palatable water is a huge factor in avoiding dehydration⁷. Water not only keeps the horse hydrated, but it helps maintain its appetite, ensures that fibre reaches the digestive system, and it allows intestinal bacteria to break down food and prevent blockages.

Sodium, Potassium, Chloride & Magnesium

It's important for performance horses to start an intense workout or competition with adequate sodium, potassium and chloride electrolytes⁷ as they play an important role in maintaining osmotic pressure, fluid balance, nerve and muscle activity⁸ and hydration levels to prevent excessive loss through sweat. Loss of these ions through sweat can cause muscle fatigue, weakness and decrease the horse's thirst response to dehydration⁸. In order to improve your horse's overall water and electrolyte status, choose a supplement that contains a potassium to sodium to chloride ratio close to 1:2:47.8. Chloride is used to balance most of the positive charge on the two main cations (positively charged ions). An effective electrolyte should contain the salts of calcium and magnesium, preferably in the citrate forms for easy solubility in the body.

Glucose (Dextrose)

Most commercial electrolyte supplements on the market contain glucose, commonly referred to as dextrose. It has been said that this ingredient is required by the intestinal cells as an energy source to fuel the absorption of electrolytes and water², however recent research carried out by Kentucky Equine Research showed that adding dextrose to electrolytes had no impact on the rate or duration of increased electrolyte levels, and a second study showed no difference in the rate of water intake from the digestive tract when comparing electrolytes with and without dextrose⁸. In other words, glucose does not actually improve hydration.

The Take-Home Message

When a horse sweats, and especially with prolonged sweating during athletic activity or travel, you will need to give it fluid and electrolyte replacement¹⁰. An effective rehydration supplement will ensure a horse consumes the baseline minerals sodium, potassium, magnesium and chloride required to replace those lost in sweat and to protect it against problems caused by dehydration and electrolyte imbalance. Electrolyte replacement will also optimize your horse's well-being and performance, both mentally and physically.

Equisel-Lyte and **Equisel-BCAA** are post work-out supplements that not only aid in rehydration of your horse, but they also assist in muscle recovery by replacing the minerals lost in sweat. The result is an increase in the rate of repair of damaged muscles using the branched chain amino acid ingredients to spare muscle breakdown after exercise or exertion.



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Lauren Marlborough has been an avid horsewoman for over 15 years with several years experience in many sectors of the horse industry. She carries a BSc from Lakehead University, an Honours Biological Science post-degree from Brock University, Certification as an Equine Sports Massage Therapist, has obtained the Equine Science Certificate with Distinction from the University of Guelph and has her own equine therapy business in Southern Ontario.

The Importance of Rehydration & Electrolyte Balancing

By Lauren Marlborough, BSc (Hons), CESMT

Why do Horses Sweat?

Hours of protracted exercise or high intensity exercise for short periods are conditions that particularly tax the ability of a horse to move heat out of the body as quickly as possible⁹. In order to remove muscular heat, a horse needs to sweat, which pulls heat from the interior of the body to the skin in a process known as evaporative cooling. Sweat (also referred to as water vapour on the skin), is first pulled from the bloodstream, continues to be removed from the digestive system, and eventually from the spaces between cells⁵. About 70% of the heat of locomotion is normally dissipated from the body using this process⁹.

One of the more challenging environmental conditions to an exercising horse occurs in hot and humid climates. High heat and humidity limit the ability of heat loss through evaporative cooling of sweat because there is less temperature differential between the hot air and the hot skin to facilitate evaporation of sweat⁹. Sweat loss totaling as little as 3% of body weight can cause almost 10% reduction in the horse's exercise tolerance. For a 500kg (1,100 pound) horse, that's only 15 litres of sweat, however, a heavily sweating horse can lose as many as 16 litres of sweat in just one hour⁷. Now factor in working a horse in high heat and humidity and one can understand how dehydration through sweat loss is a major danger and can be life threatening if left untreated⁷.

When Horses Can't Sweat

Horses who have the inability to sweat are often diagnosed with anhidrosis. This is when the sweat glands cease to function and the skin remains dry and hot after exercise⁹. The degree to which a horse exhibits anhidrosis can vary; their performance can suffer, they cannot self-cool, they have a tendency to overheat rapidly and a dangerous level of heat exhaustion can occur⁴. While considering moving your horse away from the hot, humid climate may be ideal, it is not always the most convenient decision. Misting fans and barn cooling methods can help as well as training/riding during the coolest time of the day or for shorted durations³. Unfortunately, most cases require significant management and is important to work with your veterinarian to formulate a plan to expedite your horse's return to normal thermoregulation for good health and peak performance⁴. Veterinarians have used a numerous treatments to help "non-sweaters" including sodium chloride, iodine, potassium, Vitamin E and Clenbuterol³, but the simplest of treatment is the therapeutic approach of oral electrolyte supplementation. Statistically, significant electrolyte abnormalities identified by blood chemistry analysis⁴ have been reported for horses with anhidrosis⁶. We know maintaining proper hydration and electrolyte balance is important for overall health³.



Impact of Dehydration

Dehydration significantly impacts the cardiovascular system, mental acuity, exercise performance and recovery, as well as affecting thermoregulation (the horse's ability to cool its body during exercise¹⁰). Clinical signs of dehydration include a persistent elevation of the heart rate and respiratory rate after exercise, a weak pulse, poor capillary refill, muscular weakness or tremors, sunken eyeballs, depression, dry mouth, scant dry feces, reduced urine output¹ and it has been known to increase the frequency of impaction colic and tying up. Avoiding dehydration in your horse is not just important to maintain its health and performance. It's essential to its entire well-being and life.