Dehydration in horses has serious consequences...

ELECTROLYTES

RIDE - RITE™
Electrolyte

The Dynamic Duo
for Health and Endurance

Minerals are Balanced According to Atomic Weight and Electron Configuration

Let Us Help!

Everything you always wanted to know about why, when, where, and how to use electrolytes in equine high performance and other health issues, but were afraid to ask...

Compiled by: Jim Helfter and Gordy Jordahl

For a free book, call 800-373-5971 or email us at jgh@a-b-c-plus.com

Advanced Biological Concepts®
Applied Common Sense®
Electrolytes are the SPARK PLUGS that make the body work!
Electrolytes and Body Fluids
By: Gordy Jordahl

There is a close relationship between ions and a horse’s bodily functions. The concentration and placement of sodium and potassium ions is involved in the action potential which refers to the electrical signals produced to open and close ion channels.

This is a kind of pumping system that utilizes positive and negative charges of ions to create tiny explosive forces which pump nutrient particles back and forth across the cellular membranes.

This becomes the electrical spark as these particles absorb solar energy and act like a capacitor in the ignition system of a vehicle. It builds up within itself a charge of energy that has the potential to be far greater than its original charge.

The flow of water through these cell membranes then provides electrical energy-like turbines in a hydro electric plant.

Without the sodium/potassium pump common to all cells in the body, no biochemical action can take place. This becomes reliant on the ions being balanced according to electron configuration of minerals to achieve the goal of hydration within the horse’s body.

Imagine static on a radio when there is interference in the atmosphere and the radio message becomes distorted. It is the same in a horse’s body when the water loses coherence due to ionic imbalance and becomes less organized.

Since water in the body carries vibrations and frequencies that transfer information to every organ in the body, signals and messages can be distorted when the network of the sodium/potassium pump is disrupted leading to dehydration.

Most diseases can be traced to dehydration as the electrical polarization of the cell membrane diminishes to zero and the flow of nutrient particles in and waste out ceases.

This becomes evident when ion concentrations within the horse’s body are not in tune with their counter partners (minerals) that disrupt the sodium/potassium pump.

For this reason, Ions™ and Ride Rite Electrolyte™ have become the horse’s choice in maintaining hydration and increasing the biochemical action needed for quicker response when stressed.

Note: Stress is the number one cause of dehydration.
Electrolytes

by Kendra Helfter

Visit our website for a link to watch this webinar!

Ion

- An ion is an atom or molecule where the total number of electrons (-) is not = to the total number of protons (+), giving it a positive or negative electrical charge.

- An anion is an ion with more electrons than protons, giving it a net negative charge.

- A cation is an ion with fewer electrons than protons, giving it a positive charge.

- An ion consisting of a single atom is atomic ion.

- If it consists of two or more atoms, it is a molecular ion.

Electrolyte

An electrolyte is any substance containing free ions that make the substance electrically conductive.

Primary ions of electrolytes:

- sodium (Na+)
- potassium (K+)
- calcium (Ca2+)
- magnesium (Mg2+)
- chloride (Cl−)

Electrolytes are simply minerals that dissolve in body fluid (blood & cell fluids). They are vital to a wide range of normal body functions.

- regulate body fluid levels
- nerve impulse transmission
- muscle function
- pumping of the heart
- movement of food & water in the gut
- filtering wastes through kidneys & liver
- proper balance of water & electrolytes is essential for cooling the horse
- body fluid balance is finely controlled by electrolytes, which manage the movement of water into & out of cells

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The sodium-potassium pump (Na\(^+\)-K\(^+\) ATPase) is an example of counter transport in which two kinds of particles are transported at the same time in opposite directions by the same mechanism.

A cell membrane separates the inside of all cells from the outside environment. The cell membrane is selectively-permeable to ions, organic molecules & controls the movement of substances in & out of cells.

- The cell membrane is far less permeable to sodium ions than to potassium ions.
  - Cells' internal concentration is high potassium ions & low concentration of sodium ions.
  - Cells' external concentration is high sodium ions & low concentration of potassium ions.

- Potassium ions keep escaping out of cells & sodium ions keep entering into them.
  - Cells forcibly extrude or pump sodium & take in potassium against their concentration gradient - Spending 10% - 40% of their total energy output. (sodium-potassium pump).

- An important function is to control the volume of the cells by pumping out three Na\(^+\) ions from the cells for every two K\(^+\) ions pumped into the cells.
  - Maintains a continual net loss of ions by the cells to help move water out of the cells.

- Another importance of the pump is creating an electric charge (potential) across the cell membrane.
  - Continual loss of 1 positive ion in each revolution of the pump maintains positivity on the outside & negativity on the inside.

- It is this exchange that hydrates & maintains blood pH (acid-base ratio) which is critical for nerve & muscle function.

- The proper balance of water & electrolytes is essential for cooling the horse, which done by sweating.
**Role of Water**

- Horse's body = 65% - 67% or 2/3 water
- 1000 lbs horse, water accounts for 660 lbs of body mass = 80 gallons
- 1/3 = fluid outside the cells, sodium
- 2/3 = fluid inside the cells, potassium
- Water washes through organs to bring nutrients to cells & moisture to tissues
- Flushes out wastes & toxins
- When the body runs low on water, **dehydration occurs**
- Yes, water quality matters!!

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Tufts Veterinary College
Role of Chloride

What is Chloride?

- A chloride is chemically defined as two chlorine ions. In the body, chlorine is also required as chloride.
- It is also used by other parts of the body like the stomach to create the stomach acid or hydrogen chloride.
- Chloride helps maintain the balance of acid-base (pH).

Sodium Chloride & Potassium Chloride

- Both of these substances cannot be ingested orally in their metallic form as they are highly volatile. Therefore, these two are ingested as potassium chloride and sodium chloride.
- Excess potassium chloride is less toxic than sodium chloride.
- Excess salt (sodium chloride) in the diet will cause water retention, hypertensive stress & dehydration.

- Sodium chloride separates into sodium ions that work with potassium to maintain the optimal amount of water in the body.
- Sodium maintains the level of water in the blood that flows outside cells & tissues plus regulates the total amount of water in the body.
- Potassium maintains water level within cells. Regulating heartbeat & muscle function.
- An imbalance of either sodium or potassium upsets the water balance & impairs numerous cellular activities that depend on water.
Dehydration or Excessive Sweat Loss

- **Heat Stroke**: A horse that doesn’t sweat (anhidrosis) has no effective way to unload the heat that builds up in his body. - Dangerous levels of body temperature 106-110 F after exercise [http://www.discoverhorses.com/scoop-horse-sweat.html](http://www.discoverhorses.com/scoop-horse-sweat.html)

- **Disrupts Circulation, Digestion, Damages Organs, Smooth Muscle Function**

- **Tying Up** (exertional rhabdomyolysis, Monday morning disease & azoturia). Dark red-brown urine. Electrolyte imbalances, especially low sodium, and deficiencies of vitamin E and/or selenium may predispose a horse to tying-up. Scientific investigations in England have suggested imbalances of electrolytes (sodium, calcium, and phosphorus) contribute to tying-up. Sodium & proper calcium:phosphorus ratio.

- **Synchronous Diaphragmatic Flutter (thumps)** Body is being racked with mild rhythmic spasms. Signs of stiffness & depression. Caused by electrolyte imbalance & significant fluid loss. Low blood calcium levels are often at fault, but it is also good to check all electrolyte levels, especially magnesium, potassium, sodium & chloride.

- **Systemic Alkalosis (acid/base imbalance)** Chloride, sodium, potassium, calcium.

- **Calcium** losses can be high in sweat, particularly in long distance competitions when excessive losses result in a clinical condition called “heaves”. Calcium is essential for maintaining normal, controlled skeletal & heart muscle contractions.

- Premature muscle fatigue, reduced stamina, muscle cramps & poor post exercise recovery.

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**Electrolyte Loss: Where does the sweat come from?**

- When horses sweat, water in sweat is obtained from the plasma/blood volume. Large sweat losses decrease plasma/blood volume. This is supposed to trigger a drink response.

- Inability to maintain adequate blood flow to muscles during work. Dehydration results. Thus an increase in body temperature also. Sweat is air-conditioning device.

- Horse is slow to replace that fluid due to contents of the sweat. Horse’s sweat = higher concentration of all electrolytes (horses lose 3 x’s more sodium & 10 x’s more potassium in sweat than humans)

- Increased sodium concentration in fluid outside the cells or becomes salty is to trigger a drink response. This process is slower to develop in the horse because he loses more electrolytes than just sodium, thus is slower to feel thirsty.

- When we sweat, we lose mainly water; the water loss leaves us with an imbalance that triggers thirst.

- Losses in urine & manure, consider climate conditions

- Dehydration happens even if you don’t see sweat pouring off your horse. Sweat may evaporate as quickly as it forms for body cooling purposes.

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“An increase in body temperature during exercise increases moisture content of exhaled air by 15%, put this, together with the increased respiratory volume during exercise, increases the expiratory water loss by eight fold.” - David Frape
Electrolyte Loss

- Sodium & chloride are the two major electrolytes lost in sweat.
- Normal salt does not replace the other essential electrolytes, nor will it help buffer the acidosis caused during hard work.
- While common salt (sodium chloride) is essential to horses, the high performance horse needs a more complex & comprehensive electrolyte intake to sustain peak performance.
- Not only are electrolytes lost; B vitamin losses are a daily fact which must be catered to daily. (Free Choice Stress System)
- Electrolyte losses (& any subsequent imbalances) cannot be corrected or prevented unless the horse receives support in its daily feed ration.
- Many horses are reluctant to drink, especially when partially dehydrated.
- **WATER Quality will IMPACT** all we have discussed. 4:1 Ratio
Always have non-iodized, non-mineralized white salt for free access, if possible. Do not need much if traveling.

Horses do not "store" sodium, potassium or chloride from one day to the next. Therefore, a high level of daily electrolyte supplementation is necessary only when horses sustain high sweat losses, if they are poor drinkers & if the water quality is inadequate.

Significant sweat loss cannot only be replaced with water, you will only dilute your horse's electrolyte pool.

Dosing electrolytes the night before transport may encourage the horse to drink during & after the trip assisting with re-hydration.

If a horse isn’t drinking well, supplemental electrolytes may help by triggering thirst.

Consider giving electrolytes half an hour before the start of a race/event & at intervals during competition.

The goal is to prevent dehydration by maintaining fluid balance & by prompting thirst. But the horse must still get fluid, there must be opportunities to drink.

Using electrolytes without proper water consumption will cause water to be absorbed from the bloodstream into the intestine, resulting in greater dehydration.

Check for signs of dehydration regularly, do not wait until your horse looks dehydrated. Learn to perform skin pinch, capillary & jugular refill, mucous membrane testing & listening for gut sounds.

Other signs: sunken eyes, fatigue, increased heart & respiration, weak pulse.

Continue with electrolyte supplementation when the event is completed to aid in recovery if necessary. Washington University: Hormones still work to recover lost sodium even the day after an event.

Small amounts of electrolytes can be safely given to most horses before they reach a critical depletion point.

Estimate losses, administer an amount of electrolyte supplement during the event that replaces 1/3 to 1/2 of the total losses.

If possible, keep track of about how much water the horse is consuming.

Like water, electrolytes can be retained in & then absorbed from the large intestine, so adding some electrolytes to the diet just prior to the event may be helpful.

Monitor the horse carefully. It may be best to wait several hours after finishing a long ride or event before transporting. Transportation can be a dehydrating experience on its own, transporting an already dehydrated horse may increase the potential for more serious problems.

- A 10 hour trailer ride = to 10 hours of walking without tack or rider.

Learn & adjust to your horses specific needs & weather conditions.

When preparing for an event, choose an electrolyte formula that is palatable/acceptable to your horse, do not wait until the day of the competition to find out.
Sodium Saturation: Salt is Not the Answer!

- Sodium saturation is commonly the cause of potassium shortage in the cell
- **How?** When sodium content in water is high
- Consumption of high sodium feeds
- Water softening systems - sodium chloride / salt
- If potassium is not concentrated enough inside the cell, the sodium-potassium pump is hard pressed to keep out enough sodium leading to dehydration
- Soil fertilizers contain salts & chlorides. Plant sources are generally lacking potassium, the sodium balancing nutrient. (hay)
- **What Happens?** High concentrations of sodium will cause the cells to become waterlogged to the point of bursting
- When a cell dies due to this imbalance, sodium slowly seeps in, potassium diffuses out
- The electrical polarization of the cell membrane diminishes to zero, the flow of nutrient particles in & waste out ceases
- Avoid top dressing or adding salt to the diet
- Review label ingredients. Where is salt listed in the ingredient list?

We are led to believe any water will increase hydration for the cells within minutes. This information only paints a picture that water is water because it is wet. Not true!

### Ions – Safe, Daily

- Does not contain chloride. Assists with chlorinated water. Activated charcoal filter.
- Provides nutrients to balance dead water, no ions or electrical charge to stimulate cellular functions.
- Assists with hard water. Cell membrane not flexible. Cells have difficulty utilizing nutrients from the water due to hardness.
- Provide electrolytes to balance high sodium water and/or diets.
- Always have non-iodized, non-mineralized white salt for the horse to free choice.
- Average salt per day is 1-2 oz.
- Will not disturb digestion nor cause ulcers of the esophagus or stomach.
- Highly available, chelated minerals.

### Ride-Rite

- Is to be used to trigger a drink response thus it contains sodium chloride or salt.
- Formulated with all the other electrolytes that horses lose in sweat in a balanced ratio.
- Administer orally with Pro Bi or KLPP to reduce digestive upset.
- May begin dosing 1 to 2 days prior to transport and/or competitions or trails rides.
- Consider horse’s work level & electrolyte for any additional dosing during training.

### Winter Electrolyte + Chlorophyll

- To reduce winter dehydration.
- Enzymes & Chlorophyll added for lack of pasture time.
Electrolytes

For a Strong and Healthy Horse, Try our Electrolytes!

Imbalances caused by poor quality water or feeds, or prolonged physical exertion can take a toll on your horse’s health. Our Electrolytes products supplement your horse with the essential electrolytes needed to restore imbalances for optimum health.

What are Electrolytes, and Why are They Important?

Electrolytes are often touted as elements that are essential to combating dehydration and heat stress...What are they?

Electrolytes are minerals (magnesium, potassium, sodium, and calcium) that are lost through perspiration or other forms of dehydration, particularly in heat stress situations. Under ideal conditions, electrolytes within the body flow through muscle cells to keep the muscles functioning normally. However, physical exertion and perspiration deplete cells of fluids and electrolytes, thereby weakening the muscle tissues. When a proper balance of electrolytes is maintained, each element plays a vital role in maintaining a healthy and stable body.

Sodium plays a role in maintenance of osmotic pressure of extracellular fluid and movement of fluid from one compartment to another; gastrointestinal absorption of specific sugars and proteins; normal muscle activity and function; as well as cell permeability. Potassium plays a role in normal excitability of nervous tissue and the ability of muscular contraction, especially cardiac, skeletal, and smooth muscles; intracellular osmotic pressure and ionic balance; and the prevention of heat cramps.

It is very important to remember the dangers of working in excessive heat and of the need to replace fluids and Electrolytes lost through sweating, for both you and your horses!
**IONS™** is safe to use daily because it does not contain SALT, which is harsh on the esophagus and digestive system. **IONS™** supplements your horse with balanced electrolytes to reduce imbalances which may be caused by poor quality water or feeds. Sodium, potassium, calcium and magnesium are the primary electrolytes (ions). When ions are balanced, they help to increase water consumption and retention, which can eliminate dehydration concerns and other health problems.

Include **IONS™** in your horse’s diet during heavy training and warm weather. **IONS™** is needed when manifestations of tying-up, muscle cramping, anhidrosis, Synchronous Diaphragmatic Flutter (thumps) or diarrhea present themselves.

A portion of electrolyte imbalance is due to excessive chloride found in several thousand water samples taken across the USA. **IONS™** is formulated without chloride to counter these imbalances.

**IONS™ and Dehydration**
In times of excessive heat, it is important to check if your horse is dehydrated. Do a "pinch test" on the skin of the neck to check for dehydration. Gently pinch, between thumb and forefinger, skin on the horse’s neck and pull away from the body. The skin should immediately return to its original position. If the skin does not immediately return, this is an indication of dehydration.

**Directions:** **IONS™** can be top dressed on regular feed daily. **Maintenance dosage:** 4 scoops per 1,000 lb horse per day. Feed 2 scoops in the morning and 2 in the afternoon. (5cc scoop included)

For severe cases, mix **IONS™** and **Pro Bi™** to a watery paste that will easily pass through a syringe. Administer orally 40 - 60 cc twice per day until skin returns to normal with pinch test. Follow up with Ions, top dress, per label instructions until abnormal weather conditions subside.

**Critical:** Unlimited amounts of water must be available at all times. Free choice white salt at all times.

**IONS - 3 LB BUCKET** Item Number: A243 (96 day supply)
**IONS - 7 LB BUCKET** Item Number: A244 (224 day supply)
**IONS - 25 LB BUCKET** Item Number: A242 (800 day supply)
Electrolytes are essential to the body for normal function; it is important to maintain electrolyte balance. Sodium, chloride, potassium, calcium and magnesium are the primary electrolytes. Electrolyte deficiencies typically occur due to prolonged physical exertion. When your horse sweats, there is loss of water, and these primary electrolytes. It is important to provide your horse with electrolytes during warm weather and periods of extensive exercise.

We suggest RIDE-RITE™ Electrolyte to be used pre, during, and post strenuous work or competition where dehydration would be a concern.

Vitamin B₆: Controls sodium to potassium levels in body fluids. If the sodium to potassium ratio is out of balance due to a B₆ deficiency, swelling of tissues in the legs will persist. Vitamin B₆ also increases the availability of iron, reducing the risk of anemia.

Vitamin C in the form of Ester C®: When sweat glands are overworked, C is quickly used up. When this occurs normal function of the sweat glands is weakened, thus affecting the performance of your horse.

Directions for Horses: 1/2 to 1 scoop per 1,000 lb horse per day. Mix to obtain a syringeable consistency: 1 scoop of RIDE-RITE Electrolyte™ with approx. 15cc - 30cc of Pro Bi™. You may administer orally 20cc - 40cc of this mix at each vet check. (40 cc is equivalent to 1 scoop.)
The Dynamic Race-Day Duo

PRO BI™
Microbial Benefits

PRO BI™, in final form is not a source of live organisms. However, it does supply the by-products they produce. The active ingredients in PRO BI™ have demonstrated to retard the growth of 22 pathogenic organisms. PRO BI™ provides the benefits obtained from live cultures without the problems and concerns of using pure cultures.

BE SAFE
DON’T GUESS!

RIDE-RITE™
Electrolytes

Electrolytes are essential to the body for normal functioning, and it is important to maintain electrolyte balance. Sodium, chloride, potassium, calcium and magnesium are the primary electrolytes. Electrolyte deficiencies typically occur due to prolonged physical exertion.

Endurance and Competitive Competition

ABC’s
Pro Bi™
&
Ride-Rite™
Electrolyte

Directions for Mixing

Mix 1 scoop of ABC’s Ride-Rite Electrolytes with approximately 15 cc of ABC’s Pro Bi™ to maintain gut integrity (gut sounds) and appetite. You may administer orally 20 cc to 40 cc of this mix the evening prior to the event, the morning of and at each vet check (or every 20 miles). Always confer with a ride veterinarian concerning the hydration levels of your horse and adjust dosage accordingly.
Imbalanced Electrolytes are often the primary cause of many symptoms.

Nothing moves in the body without Electrolyte balance.

For unusual or unique applications:

Email jgh@a-b-c-plus.com or call 800-373-5971, and Jim will assist you with inquiries, application, or concerns.

Applied Common Sense®