



Electrolytes

Sodium, Potassium, Chloride

Always remember that no mineral or vitamin acts in isolation – whilst the actions of each individual mineral is described as follows there are thousands of reactions occurring at any given moment in time in your horse's body that involve interactions with other minerals, vitamins, protein and energy sources.

That is why when supplementing your horse it is vitally important to supplement with all the essential minerals, vitamins and electrolytes at one time because rarely is only one deficient at any point in time. There are usually multiple imbalances.

While laboratory figures and feeding trials have their place the most important determinant of horse's health is an informed, astute and observant owner who can accurately assess their horse's condition and performance as the end result of their horse's diet.

Sodium, potassium and chloride are macro minerals – that is, they are required in significant quantities on a daily basis and they are also known as electrolytes or salts. Electrolytes are minerals that do not attach to protein molecules in the body tissues and fluids.

Electrolytes are needed for complex biochemical, physiological and neurological functions that ensure a horse maintains its health and wellbeing. They are essential for the transport of ions across cell membranes, stabilising enzymes and maintaining correct osmolality of intracellular fluids (ICF) and extracellular fluids (ECF). The production and secretion of sweat, saliva, urine, mucus and gut fluids are controlled by electrolytes. The activity of heart muscle, skeletal muscle and intestinal motility is also an integral function of electrolytes.

Sodium and chloride are mainly in ECF – 45% of sodium in the body is bound up in bone and is not available for the day to day activities of sodium. Potassium is 90% in ICF and 70-75% is in muscle. The sodium and potassium act together at the cellular level to allow normal muscle and nervous system function.

The level of electrolytes in the blood and tissues is controlled mainly by the hormone aldosterone which seeks to maintain a very exact balance and any excesses are excreted in the urine.

Electrolytes are absorbed from the gut – chloride and potassium passively diffuse through the intestinal lining and sodium is actively moved across the lining of the gut by enzyme action. The age of the horse and the PH of the gut contents affect the rate of absorption of the electrolytes.

Horses on a normal and balanced diet of good quality forage, small amounts of grain or concentrates and mineral supplements most likely consume in excess of their daily maintenance requirements. Deficiencies can occur when there is a very poor quality diet or if there is a greater need due to growth, lactation or moderate to

heavy work. With a relative or absolute deficiency of sodium they will lose less sodium in sweat, milk and urine. When they sweat less they can become overheated with work which leads to reduced performance and possibly "tying up". Chronic lack of sodium over weeks and months leads to weight loss, weakness and Pica which is excessive licking or chewing of dirt, trees and other objects to try to satisfy their craving for salt. Salt toxicity is very rare and usually associated with insufficient water access or very salty water as the only source of water available. Salt toxicity causes diarrhoea, colic, weakness, recumbency and death.

Potassium is available in fairly high concentration in most forages – any excess in the diet is excreted through urine – so deficiencies and excesses are very rarely a problem with potassium. However situations of deficiencies of potassium can occur with extreme sweating, use of diuretics, and high grain and low forage diets. There is muscle weakness and fatigue as a result with reduced intake of further potassium as appetite and water intake further fall off.

Chloride intake through forage varies depending upon the source of hay or pasture but deficiencies do not appear to be a problem.

The horse is very efficient at absorbing available electrolytes – 90% of sodium and chloride is absorbed and 80% of potassium is absorbed from the diet. Sodium and chloride requirements can be met by feeding salt but ingestion varies greatly even by the same horse from day to day. It certainly goes up in hot and humid weather and when grazing very young pasture.

The dietary requirements for maintenance are estimated to be 20-25 mg sodium / kg body weight / day; 30-38 mg potassium / kg BW / day; 75-80 mg chloride / kg BW / day – with late pregnancy, growth and lactation these needs are increased to 25-30 mg sodium /kgBW/day; 40-55 mg potassium/kgBW/day and 85-95 mg chloride/kg BW/day.

Sodium and chloride also influence calcium and phosphorus absorption and retention.

Horses in work can lose large volumes of water and electrolytes in sweat, a 500kg horse can lose 10-15 litres of water in sweat. The main salts in sweat are sodium, potassium and chloride. It is recommended that all horses are supplemented on a daily basis with electrolytes and other minerals and vitamins to supplement their natural intake. The gut is a critical source of fluids and electrolytes – roughage in the gut increases the reservoir for a horse to draw upon when it is in work and sweating.

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