

# More Mysteries Solved?

Jenny Paterson, B.Sc. Horsemanship NZ

**Hyperkalemia** means too much potassium! This is another major mineral imbalance we could be inadvertently imposing on our poor horses. It is very closely tied in with calcium/magnesium imbalances we have learned about already. The more reading a person does on the subject the more a person becomes convinced that this is the **root cause** of many of the conditions afflicting our pasture fed horses.

Think about the fact that many horses are completely OK any time grass isn't growing (winter and drought) but the *nano-second* that there is a flush of growth all of the following start to happen

- The myriad of symptoms we lump together and call 'spring fever'
- Acidosis
- Head-flicking
- Laminitic attacks (*often accompanied by or preceded by the myotonia and laboured breathing*)
- Racing around the paddock for no reason
- 'Out of the blue' uncharacteristic, violent behaviours
- Stiffness, inability to bend, tendency to 'run-off'
- Magnesium deficiency
- Tetany (*including convulsions and death in extreme cases*)

A person cannot help but think there is some underlying link. It would make a great study for someone at university.

Excess potassium interferes with calcium and magnesium absorption. On top of the fact that soils averagely lack these minerals and rapid growth outstrips uptake, absorption of what little magnesium *is* ingested can be sabotaged at the last minute by the excess potassium.

This information makes for yet another chapter in "The Case Against Rye- Grass & Clover for Horses" saga. Rye-grass and clover have an exceptional affinity for being high in potassium, especially when fertilised with nitrogen, urea, or super-phosphate which induce rapid growth during which plants accumulate potassium in their growth tips.

Hence the 'worst case' horses are those grazed on dairy pastures which can have a potassium content up to 5% or even higher.

Legumes, like clover and lucerne, are also very prone to being high in potassium providing a likely explanation for why they are known to 'send some horses nuts'.

## An outline of how sodium and potassium work on a cellular level:

"Potassium is concentrated in the fluids **inside** the cell wall and sodium is concentrated on the outside of the cell. Each time the body has to use a nerve or a muscle, potassium is ejected from the cell and the change in ionic balance sparks an electrical impulse causing the cell to react. It does so by conducting a brain impulse if it is a nerve cell and a contraction if it is a muscle cell.

Once the reaction has occurred, the original cellular balance between sodium and potassium is restored and the nerve or muscle will relax (potassium's relaxing effect inside the cell is similar to magnesium's outside the cell)"

**From:** Minerals the 'Metabolic Miracle Workers'  
by Dr Robert Erdman & Meiron Jones

A diet that is too high in potassium means that the extra cellular fluid is permanently high in potassium. This upsets the delicate sodium:potassium ratio and amongst other things, putting it simply, the nerves and muscles cannot relax.

There is even a condition called 'Potassium Aggravated Myotonia'. Myotonia means 'failure of the muscle to relax' and this is caused by this high potassium on the *outside* of the cells.

'Potassium Aggravated Myotonia' exactly describes one of my own horses and many of the horses I meet on my travels.

It exhibits as a stiffness (*can't bend, stiff movement, back legs together when cantering, continual cross-firing, a tendency to run off. They warm out of it to an extent*). Affected horses are 'on edge', often volatile, very anxious, sensitive and rigid. Some horses get noticeably worse each time the grass has a little growth spurt. Some horses are in this state permanently due to being out on potassium rich pastures 24/7.

Hyperkalemia (too much potassium) compounds magnesium deficiency and symptoms include(3):

- Tense, hard muscles, twitching around the flanks and ribcage
- Bouts of colic
- Laboured breathing
- Skin tingling
- Excessive yawning

It just could be possible that **head-flicking** could be added to the list. After all it is 'involuntary repeated firing of the trigeminal nerve in the head) We know that removing rye-grass/clover and lucerne from the diet reverses this condition. Perhaps this is because removing these plants from the diet drops potassium levels back down to where they should be.

Feeds that contribute to the ***too much potassium syndrome*** include:

***Any green, growing grass***

***Especially*** if it is rye-grass or clover

***Especially*** during rapid growth after fertilisation with nitrogen, super-phosphate, urea

***Especially*** in drought-breaking conditions

***Especially if the diet also contains other feeds which are inherently high in potassium:***

*Lucerne, chicory, kelp, molasses Ginseng, dandelion, nettle, sage, yarrow, rosehips, slippery elm, garlic, plantain, echinacea, chamomile, comfrey, Soya bean Meal*

Whilst all of these feeds and herbs can have great benefits, they need to be taken into account when arriving at the sum-total potassium content of your horse's diet.

In the case of horses, potassium is very easily obtained in the diet and is more often than not present in vast excess. Therefore it is important ***not*** to add more via the horses Vitamin & Mineral supplements.

Sure the recommended daily amount is 25gms/day for a 500kg horse (1) but

10kgs rye-grass in vegetative state @ 3.34% potassium giving them a whopping 33.4gms (1)

½ kg lucerne chaff @ 3.21% giving a further 1.6gms (1)

10kgs of grass hay would supply 19.7gms (1)

Plus if you are also feeding a supplement containing potassium.....

**Or adding** cider vinegar, kelp, garlic, many herbs like comfrey, chamomile, Echinacea. Chicory, plantain.

.On their own, (or if your horse is **not** eating the high-powered pasture as well), these feeds can have benefits but they need to be included in the total potassium content of your horse's diet.

Check that your vitamin and mineral supplement does **not** contain potassium but also that it **does** contain sodium which is very necessary to help balance the high potassium intake. A lack of sodium (salt) reduces urination which is how the horse is supposed to excrete this excess potassium.

**Kelp**

Potassium hydroxide is used in the processing of seaweed. It breaks down the all the fibre and is left as a residue of this process.

Consequently kelp is very high in potassium.

Interestingly enough **soaking hay reduces its potassium content by about 50%.(2)**

The only time there would be a necessity for administering potassium would be when the horse is in work and sweating heavily.

Hay still contains potassium in good quantities, so no need to worry if your horse is getting little or no grass, they'll be getting the 'right amount' from good grass hay.

Interestingly, humans ingest far too much sodium and not enough potassium. Most processed foods are full of sodium because we like the taste, and cooking food depletes potassium. So we end up with the opposite problem to our horses!

- (1) The National Academies 2007 Nutrient Requirements of Horses
- (2) Katy Watts [www.safergrass.org](http://www.safergrass.org)
- (3) HYPERKALEMIA Joyce Chollander-Rodriguez M.D., & James F. Calvert, JR., M.D.  
Oregon Health & Science University, Portland, Oregon

### In people:

*Charles Weber "When Blood Potassium is too High"*

*Some symptoms are said to be irregular or fast heartbeat, paralysis of limbs, drop in blood pressure, convulsions, coma, cardiac arrest, black or bloody stool, diarrhea, confusion, breathing difficulty, vomiting, extreme fatigue, nausea, numbness, tingling hands and feet.*