You can grow animals like these if you fully feed them from birth on correct pastures with mineral levels all correct, as in this pasture, and also feed Solmin in the drinking water. The long brown ryegrasses next to the back left leg have benefits. The 'establishment', before thinking, would recommend topping, which since 1950 I have never done or recommended. This lush pasture is like soup, so needs 'toast' to go with it and give better digestion. The toast is seeding, which helps keep pastures dense to reduce pugging, and to help cope with droughts. The seeds can be eaten and still germinate. The clovers, no bare patches, nor burn marks and no dung pats, all show that the soil has correct LimeMagPlus levels (Read Minerals > Calcium.). This was 18 months after I took over consulting for Bill Chynoweth on his Pukeroro Stud on SH 1 south of Hamilton in 1990 when I started consulting for him. He and his father selected calves for black strong teats.

Note the strong high clean tail because the selenium level was correct, and massive healthy glossy body of this cow and the herd. No wonder this Pukeroro Stud herd produced double the New Zealand

average per cow and as much per cow as the best herds in the northern hemisphere under confinement being fed expensive totally mixed rations (TMR) which has only 1% K not New Zealand's pasture average of 3.6% K, which should be 2.2% or less, which is better for animal health and palatability than higher levels. At agricultural college in South Africa in 1947/8 the concentrates we mixed had 1% K. 2.2% is needed for clovers to grow well in pastures. I'm researching to see if it can be lower which would give healthier animals. Topping (clipping in USA) is not necessary. I never did it. I would harvest weedy areas and put it on the top of silage stacks.

High K causes tight hard soils, hard leaves which pull ryegrass roots out, nitrate toxicity, milk fever & bloat. Red clover dies out of pastures at about 3.4% and white at about 4%. Earthworms

decrease & cow urine burns pastures. This farm never used N. See how even the pasture is. If urea is applied it will make extremely high nitrate grass over the dung and urine patches, which animals will not eat, so patchy uneven pastures develop.

These cows and pastures on the right were are what they were like when I started.

Ca was 0.6% which was too low and K and P were too high in pastures which were unpalatable which decreases animal consumption and production. DAP and MAP are the worst at making pastures unpalatable, so again animals eat less and produce less.

Optimum Ca in pasture is rare (I've seen only 1% out of 500 farms), while excess toxic levels of K are common. Almost every new client who has been using Ruakura, MAF, AgResearch, LIC, fertiliser companies, veterinarians and consultants on commisions, using soil tests, have excessively high, very costly, pasture K and high P levels. This costs farmers because potash is NZ$800 per tonne and P $400/tonne.

Potassium is needed for plant tissue strength to reduce lodging (falling over), disease resistance and to give growth, especially in legumes. Optimum potassium in plants helps with winter hardiness, disease resistance, water movement and the production of sugars, starches, cellulose and proteins.

Forages contain much more K than grains. Potassium in forages decreases with maturity. Lush, young and rapidly growing forages grown on excess K fertilised soils, especially in cool conditions, contain high levels of K, which can reduce the level and absorption of magnesium and cause metabolic problems. See the 'Interactions' spreadsheet.

This photo shows clovers lacking phosphorus on the left, sulphur in the centre and K on the right. Small clover leaves, as seen on the left, can also be from low calcium.

Chisel ploughing deeply is good for many reasons, mostly because it mixes LimeMagPlus (the best agricultural lime, finely ground serpentine and deficient items based on pasture analyses) and fertilisers down which encourages deeper rooting of plants. Read Soils > Cultivation for more on LimeMagPlus which is not a commercial product, anyone can order and buy it from any lime company that mixes good fine lime and the others required.

If potassic superphosphate, which has water soluble P, K and S, is applied, the sulphate from sulphuric acid used to make superphosphate, causes K and others to leach (discvered in India and confirmed by Massey University and me. The top soil can then become low in K, especially with shallow rooted pasture. If Ca is low, the problem will be worse because aluminium prevents perennial ryegrass roots in particular, from going down through the aluminium filled soil. Ca makes aluminium, mercury, cadmium and manganese less available.

High K levels can cause liver damage, shown on cattle by a yellowing (jaundice) on the brisket and behind the front legs, more easily seen when those parts are light in colour. Liver damage from facial eczema, any toxic weeds and high nitrates are also cause this yellowing. See the photo in the chapter on Facial Eczema.

Urine from an animal applies about 11 litres (3 US gallons) per square metre (40 inches x 40 inches). When soil K levels are high and soil moisture is low, pasture burn and root damage can occur, accentuated by high ammonia in urine from eating high nitrogen pasture from urea, in particular. High K can cause the death of grasses and clovers. This is worse in summer when cattle perspire, so their urine is more concentrated and there is less rain to wash the urine off plants. Harder grasses, such as

Paspalum dilatatum (Dallas grass) and Bermuda, are hardly affected.

After getting the correct calcium level of 0.8%, K is one of the most critical elements required to be correct in soils and pastures. 30% K is very expensive and compacts soils and makes very hard grasses which, with high aluminium, which increases ryegrass pulling. Getting all levels correct as in Plant Mineral Analysis, reduces the problems.

Animal Deficiencies

This seldom occurs with K when animals are grazed on correctly drained, limed and fertilised pastures, but if K is very low, animal vigour, feed and water intake will decrease. This results in reduced milk production, reduced body weight and loss of hair glossiness. Pica (deficiency) can occur, which makes animals chew at anything. Chewing of an item can show a need for the element concerned, such as animals low in zinc eating poplar tree bark, which is high in zinc.

Many overseas scientists, even from Slovenia, have asked me why so much K is applied in New Zealand. The answer is commercialism selling the most expensive fertiliser there is, without considering the farmers, who if they did leaf analyses, and read this chapter would refuse it.

Animal Excesses

When K is too high, deficiencies of calcium, magnesium and sodium can occur, and the incidence of grass tetany (hypomagnesemia) and milk fever (hypocalcemia - parturient paresis**)** can increase. Also oedema (accumulation of fluid) can occur around the udder pre-calving, especially if sodium is too high. Some of these can be corrected by fertilising with LimeMagPlus, which helps clover grow. When I explained the cause of the high K problem to Doug Edmeades, the then Ruakura soil scientist at a Ruakura conference, he got up and walked out. A friend told me that he did the same thing to him. So honesty and progress halts. Edmeades was banned by Ruakura from speaking to the media. Clients have had animals die from too much K. Some agricultural consultants get $12 per tonne commission and fertiliser companies keep selling farmers too much K and P. In Australia, commissions are not allowed to be paid to any consultants. If that were the case here, honesty would return to farm advisers and lime would be recommended instead of being wrongly criticised, by dishonest consultants and some researchers.

If K, P and manganese are all too high, and selenium is too low, mastitis and high somatic cell counts increase.

A farm with 4.8% K in pasture tissue had to drench with copper sulphate to keep animals healthy. Applying coarse agricultural salt at 100 kg per hectare reduces the ill effects of high K in pastures and animals.

Magnesium is antagonistic to K and vice versa. Reduce the excess K effects by increasing Calcium and Mg in the soil.

Calcium, magnesium, sodium and boron levels in the pasture should be increased by applying them. Feeding low K foods and low feed value (NOT mouldy or poor quality) hay or barley straw can help reduce high K affecting cows.

In the 2002/03 drought in Alberta the beef farmers were warned by animal feed and health specialists about possible health problems, because some feeds had tested as high as 3% K. Many New Zealand pastures have much more than that, usually due to applying too much K, as recommended by AgResearch, LIC, some fertiliser companies and consultants, based on the excessively high recommendations in soil tests. Repeated use of 30% potassic superphosphate (0 N, 6.7 P, 15 K, 7 S, 0 Mg, 15 Ca) can end in no clovers, mono-culture of hard grasses, ryegrass pulling and animal health problems. The commonly used 30% potash (which is higher than necessary anywhere, so never needed) superphosphate would give better results if it were 10% potash and 10% (50 kg per hectare) of coarse agricultural salt at a quarter the cost of K. We never used higher than 15% potash and five years after converting weed covered rough peat, won the most improved dairy farm in the Waikato, and 11 years later engaged a 50% sharemilker and retired. He (Linton Simmons) kept improving our farm for 11 years until he bought his own dairy farm and we swapped our first one for a bigger one. Unfortunately some farmers think that 30% potash is like high octane petrol, so they keep, using it and poison their soils, pastures and animals. I repeat - in the northern hemisphere where they make up mixed feeds fed in barns, they aim for 1% potassium. The only reason grazing farmers aim for more than double that, is to make clovers grow well to produce nitrogen, but don’t exceed

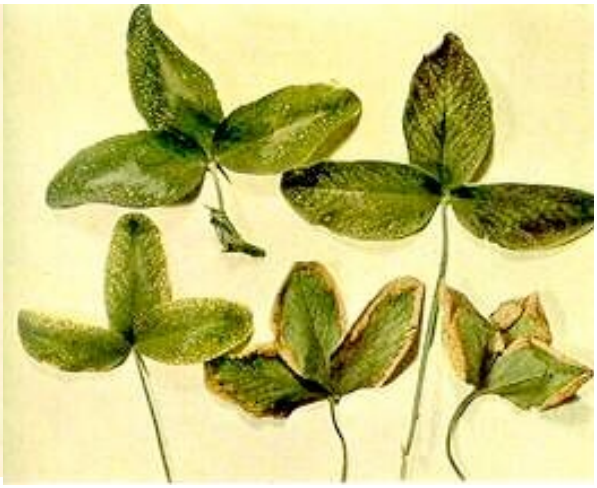
2.4%. Agricultural salt at 50 kg per hectare and LimeMagPlus at up to 5,000 kg per hectare reduce it.

Soil & Pasture Deficiencies

Acid soils are expensive because they reduce the plant absorption of costly K. Adequate and regular LimeMagPlus at approximately NZ$85 per tonne delivered, if not too far, with its deficient elements, spread after tax, reduces K leaching and increases its availability to plants on typical Waikato farms, reducing the necessity of applying so much expensive K. Liming has 50 benefits. See Elements > Calcium. An important one in todays world of avoiding toxins, is lime's neutralising of heavy metals, so absorption by plants is reduced while absorption of safe minerals is increased. See Elements > Minerals > Calcium.

Low K levels cause pasture leaves and stems to become weak, and reduces legume growth. The edges of clover leaves go yellow, then brown, then dry and shrivelled as if scorched. The centres of the leaves are seldom affected, even when K is extremely low. As shown, white clover leaves can have 2 mm (1/16") diameter black spots under them, NOT going right through them. Going right through, is a symptom of low phosphorus.

Red clover showing potassium deficiency.



Lucerne showing potassium deficiency.

I have never seen these deficiencies, but have seen the black spots occasionally.

Because of the movements to the tips, K deficiency symptoms first appear in the oldest leaves. Potassium deficient maize stalks have nodes closer than normal and leaves longer than normal, relative to the height of the plant. Cobs are shorter and, as with all plants, plants lodge more easily.

Green, growing pasture levels should have about 2.5% K, if other elements are in balance. If urine patches cause healthier grass and clovers to grow, while the surrounding areas have stunted yellower grasses and clovers, K levels may be too low. If only the grass is healthier and greener, it indicates low nitrogen in the soil, not low K.

The response to K is reduced when calcium or phosphorus are low. If soil tests show high K levels, but plant levels are low, the correction of calcium, phosphorus, boron and/or molybdenum levels can improve the plants' ability to absorb K.

Some soils release more K to plants than other soils and therefore require less K fertiliser.

Ten to 20% loss of K can occur under dairy farming through milk and on lanes. Some K is lost through leaching, especially in sandy soils, however most soils retain K better if calcium and sodium levels are adequate. We found this on our farm in 1960 and on clients' farms, such as Ian McDonald's peat at Patetonga in 1991, where no K was needed for eight years.

Raw peat has high iron levels which depress K. Once sufficient Ca has been applied the necessity for so much K decreases. Many don't know this so keep applying K, which is then hard to reduce, however water soluble sulphur leaches it, while lime and salt decrease the leaching of K and some other elements.

This is seldom known or believed, despite some of us knowing from Pasture Mineral Analysis for

decades and publicised results from Indian research in 1989, Australian Journal of Soil Research V29, #1, 1991, which I told Ruakura about, but they denied, so I told Massey University who trialled and agreed in 1997. Ruakura, as always suffering from NIH ('Not invented here' syndrome) denied it, so Massey proved it again.

Sulphate sulphur as in superphosphate is water soluble so it washes and leaches, taking elements such as K and selenium with it proved by two Massey University trials I got them to do. Using Gafsa RPR and elemental sulphur, rather than superphosphate, reduces leaching.

Low K in legumes can increase winter kill, but only if it is below 2.2%. This doesn't mean that 2.7% K in lucerne will prevent winter kill, it will just reduce it.

Soil & Pasture Excesses

Most pasture farms I visit, or see pasture mineral analyses from, have high levels of K. A major cause of excessive K levels in pastures is that many laboratory recommendations for soil K are too high for pasture, so those who use only soil testing over-fertilise with K. Many K figures have been formulated for fast growing crops such as corn, growing at up to 300 kg of dry-matter (DM) per day, not steadily growing pasture at 50 to 70 kg DM per day. Potatoes also need more K. For decades, soil and pasture scientists have agreed with me that optimum soil K figures in soil test results are too high for pastures and animal health, but the recommended soil levels have not been reduced by laboratories.

HS Gibbs from the Soil Bureau in Wellington pointed out many times that excess K on ash soils lowered Mg levels, which then adversely affect animal and legume health.

When K is high pastures will luxury feed on it, which reduces the absorption of Mg and Ca, even if their levels are optimum. High K levels increase the risk of hypomagnesemia (Grass Tetany), which occurs especially after autumn rains and in spring when short pasture leaves are high in K. High potassium levels (>3.1% in grasses) lower pasture sodium, magnesium, boron and calcium levels, so more of those need to be applied. If not applied red clover will start to disappear.

Some research information states that it is not productive to raise Mg levels by fertilising with it, but trials I have done on many soil types show that it is profitable, especially for animal health, provided it is done correctly and preferably with Serpentine (Mg Silicate). Dolomite wasn't effective on the trials I and clients did. See Elements > Magnesium. Also, if K is high and continued to be applied, it takes more Mg to increase its level. The so called researchers would have been using soil tests, not pasture.

If high amounts of any feed is brought on to the farm and fed on pastures or in yards, and the animal manure spread on pastures, K levels in pastures can increase and then be difficult to reduce.

Some grasses such as cocksfoot (orchard grass) and Matua Prairie grass can have high levels of K even when soil levels are not high. Clovers have lower levels so they help reduce the high K content in some grasses.

Over 3% K in pasture makes it less palatable. Excessively high K in pasture tissue (3.6% and above) can decrease pasture and animal production, as well as earthworm numbers. To reduce this effect, do not apply K to camping areas like small flats in hill country, near trees where animals camp, or around gateways and paddocks getting effluent. Day paddocks and ones used frequently for silage and hay sometimes need K, but base it on Pasture Mineral Analysis, not the typically useless soil tests. Harvesting effluent paddocks for silage and/or hay helps reduce K levels to where they should be. In the northern hemisphere where total mixed rations (TMR) are fed, only 1% K is aimed for in feed.

High K causes low sodium (Na) levels in pastures, poor animal uptake of Na and increases bloat. Adequate Na is required to produce saliva and for animal health and productivity, particularly in lactating cows. If pasture K levels are 3% or higher, applying more Na and/or Mg at normal rates won't increase their pasture levels much. Salt and Mg will have to be fed, preferably in the drinking water. Too much K can kill clovers, reduce pasture growth and encourage early running to seed of grasses in spring. Red clovers die followed by white clovers, especially if Ca and Na are low. Simply applying LimeMagPlus at 5,000 kg per hectare including 500 kg of serpentine and 60 kg per ha of coarse agricultural salt on Bryce Wilson's clay soil farm at Te Kawa in South Waikato, increased the clover content of his pasture (shown below before applications) from 5% to 30% in a year. His mixed pasture tissue K level was 4.1%.

These bare patches on Bryce Wilson's Waikato farm were because K was so high (4.1%) and Ca so low (0.5%) for clover seeds already in the soil, to germinate and grow. In much of NZ there are dozens of white clover seeds per square metre in soils in pasture, waiting for lime and less potassium to germinate them. Applying LimeMagPlus has astounded many farmers, after clover seeds germinate and thrive, animals clovers stop dying out of pastures. Most acid loving weeds decrease and pastures and animals thrive. See Weeds.

Here a very happy Bryce in the same position as above a year after LimeMagPlus. Similar results have been achieved on so many farms that I've lost count. The clover is from no more K.

The German plant physiologist Herr Mitscherlich showed in 1909 that the Law of Diminishing Returns applies to K. In other words, when excess K occurs, plant yields decrease, however few know this, so excess K is often recommended by those selling it, so is mostly too high. Most scientists and consultants at Ruakura, AgResearch, DairyNZ and LIC, and some who have left them, plus many others don't know about this or about how calcium, salt and boron help reduce K.

While lecturers, scientists and researchers should have made it their business to know and promote this, the first New Zealand public statement I read about the problem was in 2001 (92 years after 1909) and came from the Fertiliser Manufacturers' Research Association. What were New Zealand tutors and scientists doing? Certainly not learning and are still not. This ignorance and wrong advice is costing our farmers collectively, millions of dollars a year.

LIC consultants dismissed the information. In the 1960's, good farmers knew that applying 30% Potassic Super (0-6-15-8), rather than 15% Potassic Super (0-7-8-9), not only created excess K and reduced Mg, Na and some trace elements, but the 30% Potassic Super provided less P, and cost more. Potassic Super is often applied annually for decades, which causes more pasture and animal health problems and more bloat. Some New Zealand farmers applied 30% Potassic Super every year for decades and K levels in the soil and pasture didn't increase much, because without sufficient Ca and Na, the K and P leach.

One of New Zealand's highest producing dairy farms in 1988, producing 1,300 kg of milk solids per hectare and 380 kg per cow, had a K pasture level of 2.3%. One paddock got double fertilised with 30% potassic super by mistake, causing the K level to rise to 3.6%. When the cows went into that paddock they disliked it, ate less and milk production dropped. In New Zealand there are many pastures with more than 3.6% K. 2.5% is the optimum level for good pasture growth. Animals need only 1% in their feed for optimum health which is in northern hemisphere confinement stall-fed feeds.

High K levels discourage the grazing of grasses as do DAP, MAP, urea, and superphosphate, because they are harder to break off, increasing ryegrass pulling, so animals concentrate on eating more clover. This can happen to such a degree that clovers get grazed out (see Wilson above). If, when breaking off perennial ryegrass, it is hard or makes a squeaking sound, it shows that K is high and possibly Ca and Na are low. If the grass is soft, it shows that K, Ca and Na levels are OK.

If you are consulting and you hear squeaking and feel the grass to be hard to break off, mention it to your clients that K is high and Ca and Na are low, and when the analysis comes they'll be impressed.

The craze for applying K is so great that even some organic pastures contain too much.

A major problem with high K levels is the increased incidence of metabolic problems, influenced by what cows are fed during the last weeks before calving. K is lower in mature pasture and in silage and hay made from mature pasture, so feed these to dry cows. Feed that made from shorter pasture to the calved cows, as it will usually be of higher feed value, which is better for calved cows, who need

full feeding of highly nutritious feed. Whereas dry ones are better if fed bulkier, poorer feed to keep the rumen a good size, ready to fill after calving. Cows due to calve are best with less than 2% K in their feed if possible.

Optimum K levels in cattle feed is about 1% (repeated I know, but very important). However, to achieve fast growing clovers and then pasture, K needs to be about 2.5%. Most fertilised pastures in New Zealand contain 3% K or more. A hectare with 3,000 kg DM per ha (20 cm or 8") at 3% K has 90 kg per ha of K, or 180 kg of Muriate of Potash in the pasture, which is the equivalent of 500 kg per ha of 0-0-18. Effluent fed pasture increases K levels, grazing circulates it, while harvesting for hay and/or silage lowers it.

After winter dormancy, dry summers or cultivation, soil K is higher, because it has become available and not been used.

As organic matter increases in grazed pasture soils, soils become lighter (more organic matter and less mineral soil) so soil K analysis figures measured on a percentage weight basis increase. Pasture herbage figures are not affected by this so, as in most cases, are much more accurate and more useful.

Different plant species take up K in different amounts, with some taking up large amounts - much more than they need. The plant transports K to the growing points, so young leaves and short pasture have higher levels than the older ones. Keep these things in mind when sampling, grazing and harvesting high K pastures.

Most New Zealand farmers apply too much K because the recommended soil test figure is too high. Using pasture tissue mineral analyses as the guide for fertilising prevents this VERY costly mistake.

The Potash & Phosphate Institute, 655 Engineering Drive, Suite 110, Norcross, GA 30092-2837, USA, wrote that soil K levels can decrease after applying K, while tissue levels increased. Pasture tissue mineral analyses, which are more accurate, can show high K levels despite the soil levels being below the recommended soil figure, which again shows that the soil figure is too high. It is what the pasture is obtaining and the animals are consuming that matters, not what a so-called scientist with no practical experience pulls out of the sky and puts on paper as a suggested optimum soil level.

These improve pasture palatability and animal health and reduce K leaching, so applying them is not a cost, but a profit. K can be a cost and cause losses.

Potassium, especially in Muriate of Potash, adversely affects soil, seedlings and animals, so is not allowed by organic organisations.

Andre Voisin wrote decades ago in part II of his book Grass Tetany, Chapter 5, "Potassium fertilisers adversely affect the mineral balance of grass."

In Chapter 6 he wrote about the antagonism between potassium and magnesium in the soil and in plants. Despite this, and adverse effects on farms, farmers, influenced by soil test recommendations, some consultants on commissions and some fertiliser companies, still apply much too much potassium, when none is needed if calcium and sodium are adequate, or are applied, based on pasture analyses.

A high K level is a problem that good and new organic farmers have. It is because when they use good or organic methods, K stops being leached and remains at its high level, originally caused by following the over-high K figure recommended in most laboratories' soil tests. Using soil tests has cost and lost our farmers millions of dollars and caused soils to be sick and tight, and animals to be more prone to metabolic problems.

Leaching

Potassium leaches more from sandy soils and under high rainfall, but less from soils high in organic matter, clay soils and soils with adequate calcium and sodium.

In 1964, Hogg and Cooper found that mixing superphosphate and K (Potassic Super) markedly increased K leaching. I question why this was not publicised then and frequently since. Most fertiliser companies promote applying more K, based on their false soil test figures and greed; it costs $1,100 a tonne. A Waikato friend farming peat whom I called on as I drove up his road, thanked me profusely for calling in on him because a fertiliser company sales person was there trying to get him to add Muriate of Potash to his mix, and he couldn't get rid of her. He had learned that too much was bad and costly because his father worked for me in 1965.

In 1984, Steele and others recorded increased losses of nitrates after applying N, associated with

increased losses of Ca, Mg, Na and K. In 1991, Heng and others from Massey University found much the same. Their Department of Soil Science measured the leaching of nitrogen, potassium, calcium, sulphur, magnesium, sodium and chlorine in two trials. They used field tiles so they could measure the drainage water before it entered the main drains. In a two-year trial, on a low fixation sulphur soil, they found that leaching of these elements was 38% higher with Superphosphate than with reactive phosphate (RP) and elemental sulphur.

The application in early winter of 450 kg per ha of single Superphosphate containing 50 kg per hectare of sulphate caused a five times increase in leaching. These results agree with the field observations of Gregg and Goh in 1978 and with Smith in 1983, all of whom found an increase in leaching after applying single Superphosphate.

The first autumn rains gave the greatest increase in nitrate leaching, because levels of N had built up over the dry weather. This also occurs in organic soils.

The scientists recommended that where soils were acid enough and sulphur was needed, elemental sulphur and reactive phosphate be used.

Why haven't the above been promoted? Because fertiliser companies subsidise researchers and reward New Zealand agricultural consultants with high commissions, which is not allowed in the Australian Agricultural Consultants Association.

If Environment Waikato, other similar bodies, Fonterra and the government are genuine in reducing pollution of underground water, why don't they encourage organic farming, or at least their principles? It is so simple. They gave five million dollars for stupid research on ruminant methane, big sums for genetic modification and theory, and nothing for the important aspects of soils, earthworms and chisel ploughing, to achieve deep rooting of plants, to reduce leaching and increase carbon storage in soils, where there is more in the world than in all the vegetation. See Research.

Kinds of Potassium

Organic organisations usually forbid the use of Muriate of Potash (potassium chloride) and stipulate the use of Sulphate of Potash. Its sulphate, and the sulphate in other elements in a fertiliser mix, that help make reactive phosphate more available, but too much sulphate increases leaching of sulphur, potassium and other elements with it, such as Selenium.

Toxic

The few soil insects that can be seen, such as Black Beetle, are often blamed for all ryegrass pulling, even when there is only one per square metre. The most common cause is the Ca level lower than the 0.8% it should be. At this optimum level, Ca makes heavy metals less available. When lower, heavy metals get into plants, including the vegetables we eat, causing humans to have excess mercury, cadmium and manganese in their bodies.

A problem that is rampant, is blaming all sorts of things rather than the real ones.

The main reasons for ryegrass pulling are not soil pests, as some commercial organisations have said for decades, just to sell products, but one or more of the following real causes -

1. High aluminium levels in soils caused by a lack of LimeMagPlus. Aluminium stops ryegrass roots going through it, so roots grow horizontally above it. Read Elements > Aluminium.
2. High K that makes stems of ryegrass hard, so rather than break off when grazed, cattle pull them out which is very costly, and pasture destroying, much more so than insects.
3. Sodium softens pastures and makes them more palatable. Low Na levels make grasses harder, reducing palatability and increasing pulling.

High K at 2.6% or above is a double negative because it makes grasses hard, so reduces animal consumption, and increases ryegrass pulling. Potassium sulphate is highly soluble, so leaches which is an expensive loss when it costs over $800/tonne. Most farmers in New Zealand waste money on too much K which suppresses Mg and causes other problems. They should put that money into Lime, Mg silicate in serpentine, natural coarse agricultural sea salt and deficient trace elements.

The establishment (Ruakura, AgResearch, Dexcel, DairyNZ, Universities.) should know these things, but since the Labour/ACT government in 1984-8 stopped helping the above, the good old research for which Ruakura was world famous, stopped.

Some who applied poultry manure each year for three years have increased nitrates and K levels to excesses, which caused bloat and animal ill-health. Once these levels get high it is very hard to

reduce them but LimeMagPlus helps.

When K is needed, forty kilograms per hectare in fertiliser or lime mixes twice a year, is usually enough, but be aware that poultry and effluent manures can have too much, so no more need be applied. Some soils already have too much. Pasture analyses are the only way to be find out and make accurate decisions. Soil tests can't which some of those recommending Overseer have at last recognised. Also its not being able to record trace element levels makes it useless.

Low Ca levels that also make grasses harder, accentuates the ill effects of aluminium. The result is that cattle pull the ryegrass out because it is too hard to break off, as done by grazing cattle. Sheep bite it off. 99% of farms I visit have low Ca and low boron, high K (above 3%) and many have ryegrass pulling, which some blame on soil pests such as black beetle, when it is not.

Most farmers apply too much K, some even after joining GrazingInfo, encouraged by most scientists and all fertiliser companies selling it at $900 a tonne. Organic farmers applying Sulphate of Potash benefit from it leaching some of itself so K levels don't get too high. I see this as one reason why red clovers thrive on organic farms when they don't last more than two years on chemical farms applying too much muriate of potash, especially if using the recommended levels in New Zealand soil tests, which are too high. Red clovers are deeper rooting, which is beneficial in the dry summers.

Sources of Potassium

Natural

Animal urine
Poultry manure
Dairy effluent

Artificial

Muriate of Potash - 50% K and 48% chloride; Cost at 13 November 2011: $950.00
Sulphate of Potash - 42% P and 17% S; Cost at 13 November 2011: $1,180.00
Some fertiliser mixes such as Potassic Superphosphate and in some Crop and Pasture mixes.

Human consumption

Organic bananas. Non-organic are high in sprays and heavy metal toxins.

Russia has a lot of potassium mines and there are smaller deposits around the world. Some potassium we now use was formed 200 million years ago after the evaporation of the Zechstein Sea in Germany over a long period, during ancient global warming. Some Greenies and all Global Warmers please take note. Warming is not new and is not man-made. The Vikings sailed across the arctic and the North Pole every summer. They were Scandinavian seafaring pirates and traders who raided and settled in many parts of NW Europe between the 8th and 11th centuries.

Scotland was warmer then. These are facts, not future forecasted garbage that has never been accurate. In the 1970s the same forecasting groups claimed Global Freezing was coming 'caused by humans. Potassium sulphate is highly soluble, so leaches which is an expensive loss when it costs $800/tonne.

Most farmers in New Zealand waste money on too much K which suppresses Mg and causes other problems. They should put that money into Lime, Mg silicate in serpentine, natural coarse agricultural salt and deficient trace elements. The result is that the high levels kill red clovers and then white clovers resulting farmers losing clovers and not knowing why

Vaughan Jones, ONZM Queen's Honour 2013, for services to the farming industry. NZ M.Mkt.I.

Dairying 99% Honours Award 1948. Waikato Most Improved Dairy Farm Award 1959. International Agricultural Consultant & Journalist. Represented NZ in Agricultural Journalist Congresses in USA in 1992 & Austria in 1994. Managing Director of the free GrazingInfo Ltd, compiled since 1970.