Introduction

Salt has 37% sodium and 60% chloride. It is needed for animals to make their saliva which is the first digestive juice, so is important, and needed to help temperature control, minimising winter cold stress and summer heat stress.

There is ample evidence that salt is essential for both soil and animal health. Some vets and I recommend including salt in the daily drenches given to dairy cows when drenching against facial eczema with zinc and for bloat control, or better still in the drinking water. This is not necessary when feeding DeLaval mineral Solminix (currently the best soluble mineral mix) through the water. Facial eczema doesn’t occur under good farming based on LimeMagPlus (Read Elements > Minerals > Calcium) and when Solminix is supplied in the water through a dispenser.

Maize silage, which at times can be a major portion of diets, is extremely low in Na. Most pastures are low, especially tropical ones which don’t take it up, and in high rainfall areas, unless near the coast.

Salt deficiency can occur, especially in young stock and milking cows, more so on pumice and peat soils because they are very low in sodium. It should therefore be fed, preferably with other needed elements, in the drinking water through a dispenser.

Feeding salt

Always have fresh clean water available. Don’t put salt through the water supply until it’s fully dissolved. Know the percentage needed and taste it. Solminix (80% salt) fed through the water at 0.006% of the total cattle herd weight is very beneficial, with tremendous advantages, and has not caused any problems, but has given a lot of benefits to animals and cow’s milk quality.

Never feed crushed salt in the paddock because some can eat more than is good for them. It’s usually OK to feed it in the exit lane from milking when cows are keen to go on to new pasture.

If you must feed salt in the paddock, use salt blocks. Cattle don’t eat enough loose salt to kill themselves, but salt starved sheep have done. As with all things, make changes gradually.

A farmer on pumice soils near Tokorah had cows die from low sodium, that a vet said was low magnesium.

When these heifers on the right arrived from a stock sale on the 18th August 2008 on Barry Brunton’s Ruahuna loam soil farm they looked dreadful, their long shaggy hair and selenium scours indicating a lack of salt and selenium. They were so nervous that I had to use a zoom to take these photos.

They cost NZ$425.00. His veterinarian recommended a drench for worms, but I said, not to, but feed them well and give them Solminix in their water. This photo taken a week after arriving, shows their deficiencies. They were ready to be moved. As shown below, they were then fully fed on correctly limed and fertilised pastures based on a pasture analyses of 17 elements and fed Solminix through an inline dispenser.

This is November 2008 three months after purchase when the crossbred vigour, Horsham-Friesian cross heifers in the paddock.
Lick blocks don't work

Mineral blocks can be either unpalatable, or if with molasses, so palatable that they are gorged by some animals, so can't be used to supply the optimum amount of minerals. Supplying salt and minerals through the drinking water removes this problem, and ensures that all animals get their correct amount. Most animals prefer correctly mineralised water, so drink more. Farmers must remember this when supplying minerals in the water, so must adjust the dispenser to supply the same amount all day and night. I've seen calves wait for the minerals to be added before drinking and several farmers have told me this. Dairy farmers would not want milking cows to not drink because the minerals had run out.

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Mineral lick blocks, while a help in the past, are not as good as minerals through the water, because some stock don't lick them, and a researcher at Cornell University, USA, tongue in cheek, said that for a high producing milking cow to get enough salt from a lick block, she would have to spend all day licking, and would wear her tongue away in the process!

Self-help minerals fed individually don't work as has been proved by many farmers and Cornell University trials. Magnesium, another necessary element, is bitter, so animals avoid it.

Some eat salt and some don't. Those that eat it have healthy moist noses, ample saliva and glossy hair, rather than long shaggy dry hair.

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Self-help mineral feeding doesn't work as has been proved by many farmers and Cornell University trials. Magnesium, the one most necessary after salt, is bitter, so is ignored.

Some eat salt and some don't. Those that eat it have healthy moist noses, ample saliva seen when chewing the cud, and glossy coats with tails and heads held high like the Hereford bull at the top right that came from a farmer fertilising and supplementing with all deficient elements, based on pasture analyses. This farmer had loose lick available near the dairy. He had noticed that some stopped and ate it and looked better, while the one in the foreground didn't so showed a lack of zinc (hair on crown), low cobalt (long hair on top of the neck), low tail with muck on rump (low selenium). The cow in front of her was not eating enough minerals. The one at the back left with a sheen was eating more. After showing the farmer these pointers, he installed an on-line dispenser.

The farm was overstocked so some animals suffered, which is unprofitable. Selenium, is an essential element and can't be fed ad-lib unless you want dead animals. Seaweeds have more than pastures, but supplying enough Se that way is expensive, won't provide enough Se, and as with most seaweeds, it is high in toxic elements.

Saliva is the first digestive juice, and is high in sodium which is necessary to neutralise the rumen.
The above are some reasons why supplying a soluble mineral mix of the nine essential elements through an on-line tank dispenser with no steel to rust and no moving parts to wear out and need servicing, is beneficial and far better than feeding kelp with its excess iodine and high cost. Some seaweeds in some waters block pipes and causes animal health problems, which Solminix hasn’t. New Zealand is high in manganese so New Zealand invented (VJ) and made Solminix, in 1987, has none.

**Optimum levels**

Cows and pastures with optimum sodium and other levels should look like this average 550 kg Pukeoro cow and herd, which produced twice the NZ national average of milk solids per cow.

In the Northern Hemisphere where they monitor and control levels of all minerals in feed supplements very accurately and successfully, they get double our national average production per cow. They aim for 0.5% of Na in the ration. Most New Zealand pasture leaves should have at least 0.2% sodium, so a cow eating 20 kg of pasture dry matter per day would get only 40 g of salt, which is about half what they need.

Most pastures in medium rainfall (> 750 mm or 30 inches) in the middle of USA and Europe (both well away from the sea) have Na pasture levels of only 0.01% to 0.05%. Pasture sodium levels are only about 0.02% in inland USA States (except on salt plains) and inland countries such as Switzerland.

0.2% Na can only be achieved in temperate pastures near the coast or if fertilised with coarse agricultural salt at about 40 kg per ha twice a year. To replace that lost in milk, perspiration and urine, a 500 kg milking cow in full milk requires 90 g of salt a day, so if it receives 46 g from pasture it needs 44 g more salt each day.

Solminix is recommended to be fed at least 0.006% of live weight, which is 30 grams/day for a 500 kg cow, containing 23 g of salt per day. The high producing (double NZ average with no grain) Pukeoro Friesian herd in the Waikato, averaging 550 kg live weight and on pasture, forage crops and maize silage, depending on the season, kept increasing milk production up to 55 g (0.01% of live weight) of Solminix a day. This supplies about 35 g of salt as well as optimum magnesium, sulphur, zinc, copper, cobalt, selenium and iodine, which contribute to their high milk production.

The beauty of using an on-line tank dispenser and a soluble mineral mix is that the total amount needed by all animals on the farm is added to the tank once a day for dry stock, and twice for milking cows. High producing milking cows need and drink more than dry ones, so get more minerals, and calves drink less, so get less, race horses in training need and drink more, so get more. Tank systems get the correct amount to animals daily in hot and wet weather. Metered dispensers are not as accurate, and give animals less Solminix when drinking less in cool or damp weather, and more in hot weather.

If oedema occurs in cows, feed less salt before calving. The correct amounts of High Magnesium should not cause problems.

Always start it gradually over about a week, and, if having to stop, do so over at least a week, because all bodies need to adapt.

Pastures should have leaves analysed once or twice a year for the 15 important elements, to avoid the risk of a deficiency, the ill effects of which can be costly. However, it is usually impossible to supply all animal needs through pasture, so a soluble mineral mix should be supplied through a water dispenser. As explained above, this improves animal health and production and reduces the frequency of internal parasite drenching in young animals.

When feeding loose salt to animals deficient in salt be careful that gorging doesn’t occur. It is wasteful and can adversely affect some animals.

People arriving in New Zealand a 150 years ago, especially in Canterbury, were dying until they discovered that iodine was lacking. It was then added to all table salt. Animals need it too. Goat kids die if their milk is fed to them.
leaches very quickly.

Sodium levels can be measured in urine, but what is the point? It is known that it is needed, so measure it in your pasture and add it to fertilisers as required (usually at about 50 kg/ha or 45 lb/a) and in the drinking water as part of a soluble mineral mix.

When cows have mastitis their milk has extra sodium, so more is drained from the animal’s system and needs replacing.

Optimum sodium requirements in pastures vary between animals. Lambs cope with the lowest levels of about 0.1%, then lactating ewes, then cattle, then calves. Lactating cows need the most at 0.15% minimum or 0.2% optimum. Some claim that sodium content in pasture of 0.005% is adequate for non-lactating cattle and 0.01% for lactating ones, but trials on puntic soils in the Bay of Plenty show they are wrong, however, how wrong depends on the potassium levels in particular, and levels in grasses to a lesser degree. Where the potassium level is high, extra Na helps balance it. Pasture analyses show that most New Zealand fertilised pastures have K levels much too high and Na levels too low for animal health (unless very near the west coast where salt is in the rain in the prevailing westerly winds).

High potassium levels suppress sodium uptake, while low potassium levels enhance sodium uptake. Clover samples with high sodium levels (greater than 0.50%) therefore can be low in potassium. Interpreting sodium in this way can assist in assessing the potassium status, as sodium is not an essential element for plant growth, but is for making pastures more palatable to increase consumption, so animal production.

Central Europe is very low except where there are salty soils pushed up out of the sea long ago. Pasture analyses I’ve done in NZ show that paddocks close to the Taranaki coast have ample sodium and get no bloat and ones at the back of the same farm have a lot less Na and get bloat. Clovers don’t like high K. Applying no more K, but 50 kg/ha of common agricultural salt, made clovers return without oversowing them on Bryce Wilson’s pastures containing 4% K from fertiliser company advise. At Te Kawa West, in South Waikato. Others have achieved the same.

Cadmium in the rubber bands of Van Heusen underpants poisoned my body causing itchy hips. See Human Health Elements > Cadmium.

John Turner, experienced and astute consultant to Hill Laboratory, wrote, “Paul C Chiy and Clive J C Phillips found that fertilising with sodium (salt) reduced the concentrations of cadmium in soils.”

Animal deficiencies

These Holstein heifers grazing cocksfoot and fescue in Wisconsin, USA, not fertilised with salt and not being fed salt or minerals, were lacking salt so licked each other vigorously to try to get some. A pasture tissue mineral analyses showed very low Na (0.02 ppm) which is typical in locations in the middle of continents well away from the sea.

Horses exerting themselves and perspiring can become very deficient in sodium.

Salt deficiency causes frequent drinking and urinating, less saliva, long, dry, stiff, brittle, rough colourless hair (brown hair in black animals, faded in others); diarrhoea, more milk fever, shivering, more grass stagers, more bloat, poor conception, lethargy, decreased appetite, lustreless eyes, decreased milk production, poor digestion of protein and sugars, loss of body weight, broken bones, downers and deaths. They can lick each other, eat soil and urine covered bedding, chew at salty items such as trees and treated fencing posts, and try to drink urine, although urine from low sodium animals can have almost no sodium.
on it. It is like us drinking more liquid than really necessary, after being very thirsty. Poultry deprived of it and then gaining access to it, can poison themselves. I was taught this at agricultural college in 1946/7, but it still occurs because many people are unaware of it. Feeding sufficient in drinking water eliminates the problem.

A Northland dairy farmer had two small streams, his cows had to walk through to milking. The first one was fresh stream water, and the second was tidal. Even on a very hot day, the cows would not drink the first one, but would drink the second one containing sea water.

Wild buffaloes in USA get sodium (and no doubt other minerals) by eating the soil around prairie dog burrows which contains sodium from urine. Wild animals will travel miles for salt, gorge then return to grazing. Elephants in Asia travel miles to eat salt in a cave and then return to their normal feeding area. If lacking, dairy cows, deer, pigs and other wild animals will eat large amounts of soil in banks which contain small amounts of salt. Once supplied with salt, they stop eating soil, unless another element is lacking.

A Waikato veterinarian frequently drenched a saline (salt) solution to ‘downer’ calved cows already unsuccessfully treated for milk fever and grass staggers. Within 20 minutes of receiving sodium many have got up. The same has been achieved with zinc if it is deficient. Our grandfathers when making hay added salt to it, a good practice before dispensers, but now seldom done.

Some soluble mineral mixes don’t contain salt which in some cases is the most important one.

**Proof**

A survey I did of 21 Waikato dairy farmers showed that drenching with Solminex or supplying it in the drinking water caused half the herds to have less mastitis. Supplying Solminex in the drinking water through an on-line tank dispenser all year has given production, fertility and health benefits in many herds and halved the somatic cell count.

An increase in milk production from cows given a salt supplement was shown by Babcock (1905) (2). (Aines & Smith, 1957) (1) showed sodium rather than chloride to be the cause of the milk production response.

Direct supplementation of salt to animals is probably the most effective method of correcting a deficiency, but the use of salt as a fertiliser is an alternative method by increasing sodium in the leaves of pasture.

Symptoms of a sodium deficiency may often be confused with other nutrient deficiencies or sicknesses. Whitlock et al. (1975) reported an example of sodium deficiency in lactating Holstein cows. All salt was removed from the diet. The water contained sodium naturally, giving cows the equivalent of 10 to 15 grams of salt per day. The first signs of sodium deficiency were that cows showed excessive urination and increased water consumption to approximately 80 litres a day. During the first year the 45 cow herd dropped 40% in milk production. Reduced feed intake and loss of body condition were common. If beef cows drop the same, their calves will suffer.

Infertility is one of the common problems of heat stressed cattle grazing low-sodium pastures. In a German (not a hot country) study, researchers found that conception rates of 1,000 cows on 46 farms averaged 51%, but when supplemented with salt conception rates rose to 70%. Germans say 7 K (potassium) to 1 Na is ideal, which in pasture would be 2.8% K and 0.4% Na, but even temperate pastures can only have about 0.2% Na (unless applied every few months, depending on rainfall), so more must be fed. Na in tropical grasses is about half that.

Chui and Phillips (1991) grazed 24 lactating dairy cows on paddocks where all, one-half, or none of the perennial ryegrass pasture was fertilised with salt at the rate of 50 kg/ha. Half of the cows received 50 grams of salt per day in their concentrate feed. Salt fertilising increased pasture growth rate, sodium pasture levels from 0.29% to 0.49% and decreased potassium. Milk yield and live weight gains were increased by salt fertilising. When given an option, cows selectively grazed the salt fertilised pastures. Ruminating time increased and digestion improved after salt fertilisation and supplementation.

Spring is best to avoid the leaching loss of New Zealand’s high winter rainfall and to reduce bloat effects, but it won’t eliminate severe bloat.

In experiments (Chui et al., 1993), voluntary intake of perennial ryegrass fertilised with salt or urea or a salt and urea mixture was increased by 300% compared with the intake of non-fertilised pasture. The differences in intake were due to sodium intake and availability rather than due to the protein content of the fertilised pasture.
Researchers have known for years that high potassium intakes decrease magnesium absorption by animals. Clay and Phillips (1995) showed that magnesium absorption increased 23% when sodium was added to a high potassium diet, which almost all dairy farmers have before reading and applying GrazingInfo information.

Four conditions where sodium deficiency is likely -
1. Lactating cows which have high sodium losses through milk.
2. Growing livestock which have a high sodium requirement. The body contains 0.2% sodium and blood serum contains 93%, where it regulates blood pH.
3. Grazing animals in hot climates, where pasture sodium concentrations are low, and there are large losses in perspiration.
4. Grazing wrongly fertilised pastures where potassium levels become high and sodium low, which is typical in many temperate pastures. When sodium is lacking and potassium is high, potassium levels in urine increase which is part of the reason for urine pasture burning. This is accentuated in hot weather when animals perspire more, so urine is more concentrated. Animals trying to rid their bodies of the excess potassium work their kidneys and livers harder, with stressful results. Damaged livers can fail to cope, so the animals become more subject to other problems including eczema.

The incidence of grass tetany hailed after salt was applied to pastures grazed by beef cows. NZ AgResearch trials on sheep in the punice areas which are very low in Na achieved substantial benefits from applying salt. Three Marlborough, South Island farm trials grazing ewes gave increased milk production and body weight recovery after lambing, with up to 10% greater weights in Na supplied ewes. Most of the gain was between tailing and weaning. Their lambs were slightly heavier at weaning and suffered fewer losses.

1998 NZ AgResearch trials drenching salt at 38 g/cow/day on a low-sodium sandy punice type soil near Reporoa in the middle of the North Island, gave a 12.8% increase in milk solids (MS - fat and protein) worth $172/cow pa at a payout level of $5/kg of MS for a cost of $4/cow. See www.salt.co.nz

NZ peat (USA called “muck soil”) is 98% raw organic matter is also very low in sodium. Research by Lincoln University students on Mt Grand Station, Hawea near Wanaka, found that sheep were strongly attracted to areas where salt had been spread. On a large ranch applying salt to areas at the back of large paddocks that were under-grazed encouraged sheep to go and graze them first.

Spreading salt on sodium-deficient South Island hill country pasture may be a way to help establish new pasture species (R J Aspinall et al. 2004) with trampling after oversowing.

The Imperial Chemical Industries (ICI) a British chemical company was the largest manufacturing company in the British Empire employing 29,000 people with a turnover of £4.8 billion in 2006. They added salt to their nitrogen fertiliser after trials on mineral soils produced more pasture growth and 15% more milk because animals consumed more. ICI is now Dutch owned and named AkzoNobel.

When first feeding salt to sheep which are low in Na, be careful that they don’t rush it so much that deaths occur from smothering (sheep piling up on each other to get at salt) which has occurred. Providing many feed sources reduces this possibility. If animals gorge on it when it is supplied, there is likely to be a benefit in providing it in fertiliser and water.

Salt can be safely fed with zinc during facial eczema periods, but, if drenching, salt can close the reticular groove and cause the drench to by-pass the rumen. When drenching with bloat oils it is particularly important to avoid this. Drenching with very cold water can close the reticular groove even more so than salt, copper, etc. See Animals > Health > Drenching.

Milking shed drenching doesn’t help the young stock, or the cows when they are dry, which is a time they need it as much as any, especially if on sappy grass during cold wet weather and growing a calf. A way of achieving this is with a tank dispenser, which can have the required amount of salt (or any water soluble product required) added to the tank during or after each milking, or any other convenient time every day. See the spreadsheet Minerals > Soluble Feeding.

As with any supplement, care must be taken to avoid sudden changes, which can cause animals to...
Animal excesses

Supplementation must relate to sodium and potassium levels in pasture and other feeds. Over consumption of salt can cause frothing at the mouth, nervous animals, thirst, swollen tissues, oedema in cows (especially if pasture K levels are high), loose droppings and deficiencies of other elements, especially magnesium and, if continued, calcium, to the extent where bones will lose calcium. Some in-line metering dispenser systems can cause over-dosing, whereas tank on-line dispensers supply only the day's requirements, as added each day.

Feeding salt

See > Feeding Minerals

Cows grazing correctly fertilised pastures getting 50 kg per hectare and the recommended 30 grams of Solminix per 500 kg cow per day get this amount of sodium. Don't feed dry or springing (freshening) cows too much salt or sodium bicarbonate without other minerals such as magnesium, because excess sodium can cause oedema and/or milk fever at calving. Solminix at the recommended rate avoids this problem. Good soluble mineral mixes based on salt usually have magnesium as the second highest element, so are not a problem when fed through the drinking water at 0.006% of the animals' live weight which is 30 grams per 500 kg animal per day. Feeding salt on its own is not advisable, but, do so at 0.004% to 0.005% of liveweight, depending the pasture sodium level.

If sufficient salt is fed, especially with maize or millet silage, sodium bicarbonate should not be needed, but maize has only about 0.03% so needs salt to be added when making silage so as to mix it in thoroughly to reduce waste when feeding in paddocks through rejection. Bad mixing increases waste because some has too much salt that cattle like, and some gets none, so cattle don't eat it. See Silage.

The older, drier and finer the salt the better, but course salt is cheaper, so if it dissolves quickly enough, use it. Warm water dissolves salt more quickly. Some farm waters take longer. Some copper vessels take longer to dissolve. Oxidation won't, so don't use them for adding to drinking water.

Soil & plant requirements

Dr Max Turner, a scientist at Massey University, conducted pasture trials in the early 80's using salt as fertiliser in the lower North Island where most sodium levels are not what many would consider to be critically low. He recorded dry matter responses to salt and found them to be similar to those from potassium, and found that salt could be substituted for potash. At least one honest fertiliser representative has told farmers that they can use salt as a substitute for some of the potash fertiliser. Some of those selling potash at NZ$900 a tonne will not do so.

If needed, fertilising with coarse agricultural salt at about 50 kg/ha is the ideal way of correcting soil and animal imbalances, and helps increase more temperate pasture sodium levels, makes ryegrasses (and possibly others) softer, and increases the DM yields of crops such as turnips, which need salt for optimum yields.

Common coarse agricultural salt at about 50 kg/ha (36 lb/a) also makes pastures more attractive to animals, especially if artificial N has been applied. ICI in UK proved this with cows eating and producing more milk when salt was applied with the N. They market an N and salt fertiliser mix. Salt also counteracts high K levels which many farms suffer from and which animals don't like, especially where animal effluent is applied.

Levels in pasture and crops vary depending on their type, soil levels and rainfall, with tall fescues at 0.6% the highest, followed by phalaris at 0.4%, downwards through oats, chou-moillier, velvet grass, kale, subterranean clover, cocksfoot, white clover, winter ryegrasses, perennial ryegrasses, prairie grass, barley, lotuses, to fescues and rape at 0.2%. These plants are natriophiles, because they take up sodium, but seldom enough for animals, and certainly not enough for exercising horses. Fertilising natriophiles with salt helps balance pasture cation levels, which reduces the incidence of metabolic problems.

Most tropical grasses and are natriophobes so don't take up much sodium in to their leaves irrespective of soil levels, so, when grazing these, or hay or silage from them, even more salt is necessary to be fed. Japanese millet, paspalum, kikuyu (pennisetum clandestinum), Bermuda or Couch (cyperodon dallon L.), Timothy, lucerne, arike clover, lupins, sorghums and maize have about 0.01%.
cows. Animals grazing mature natriophobes can crave salt so much that they can gorge on it if they are allowed to. Sodium is not an essential nutrient for all plants; chlorine is. Both are essential for farm animals. If you need to fertilise grass pastures with sodium you can use sodium nitrate (saltpetre). It has 27% sodium and 16% nitrogen. Apply it to give the amount of N required.

Salt is water soluble so leaches in high rainfall areas. To reduce leaching use very coarse salt at 20 to 50 kg/ha annually, depending on the pasture analysis and the other fertiliser being used, for example Gafsa RP has 1.2% salt. Applying more than 50 kg/ha can be wasteful because more will be lost by leaching before all can be used. High potassium levels and using artificial nitrogen increase the need for applying salt.

A major benefit of fertilising with salt is the fact that it, with calcium, reduces potassium leaching (India, Australia, Massey University, NZ and my findings).

When soils are deficient, fertilising with salt aids earthworms. In deficient soils I've seen dozens of earthworms gather closely where water with Solminex was running over from a water trough. I spread a level teaspoon of Solminex per square metre of 10 cm deep lawn clippings to make compost because trials I did showed that earthworms went to the areas where I spread it at this rate. Vermicast earthworm cast fertiliser producers apply a lot of lime and a mineral mix.

Salt slows the uptake of moisture by roots, so reduces the sappy, fast growing, moist, spring pasture problem. Don't exceed 50 kg per hectare per application, and not more than twice a year.

There are sodium-loving plants such as brassicas (turnips, swedes, sugar beet, mangolds) and barley. They are able to withstand drouth better when sodium is adequate. Brassicas yield more when salt is adequate. Tropical grasses don't take up much sodium, even if applied.

Salt used as a fertiliser increases the succulence of some plants, encouraging higher animal consumption, so higher production.

It has been known since 1943 (Mineral Deficiencies in Plants by T. Wallace, CBE, MC, D Sc, FRIC, VMH, FRS) that fertilising with salt can be beneficial and sometimes save having to use so much potash, to the benefit of soils, pastures, some crops, animals, and the bank balance, because salt is usually a quarter the price of potash. Despite this, very few use it, but many pour on potash in the mistaken belief that, because a little yields more, a lot will grow even more. Salt can be used to replace most of the potash required, provided lime is also applied to help reduce potassium leaching.

**Soil & plant deficiencies**

Bryce Wilson's pasture shown here were so high in potassium (3.9%) that most clovers had died. Applying 50 kg per hectare of coarse agricultural salt costing $9 with 3,000 kg per hectare of agricultural lime and trace elements costing $180, got clovers growing again within months. No expensive K was applied for years, saving money. The soils, pastures (shown below) and animal health improved.

Pasture low in Na (especially if high in potassium) is harder (so pulls out more as shown above) and is less palatable, so animals eat less and young stock grow slower.

Turnips low in Na grow leaves more horizontally from the crown and wilt more quickly in dry weather. Brown scorch on leaf margins can also occur. Applying artificial nitrogen, especially urea, increases Na depletion and leaching.

**Soil & plant excesses**

An excess of Na displaces potassium, creates saline soils and can reduce the amount of moisture some plants take up, so that when rain stops they wilt sooner. Too much sodium can be toxic to some plants. These conditions are highly unlikely to occur where sodium levels are so low that salt has to be applied, because these are almost always high rainfall areas which leach some Na.
moisture, so continued evaporation leaves salt behind.

The removal of trees and growing crops in hot windy conditions can cause saline soils to develop, because rain falls and soaks in, then, as the top of the soil dries out, moisture moves back up carrying salt, and evaporates leaving it nearer the surface. Trees keep winds higher, give shade and create cool breezes under them, all reducing evaporation.

Ryegrass, strawberry clover and Kikuyu are relatively tolerant to saline soils, whereas red and white clover are not. Irrigation waters high in sodium, calcium and or magnesium can create saline soils.

Saline soils lose their structure and become lifeless and resistant to water permeability, causing plants to exhibit signs of drought. Gypsum can be used to lower soil salinity to a degree, but the cause must be removed.

**Salt and bloat**

Dr Max Turner of Massey University in the early 1980’s achieved bloat control with salt on trial plots, and later, on farms in the Manawatu, Southern Hawkes Bay and Taranaki.

In the 1990s a farmer who substituted salt for potash in his spring fertiliser reported less perennial ryegrass pulling, more even grazing of pastures and less bloat. Another farmer had a new grass paddock the cows wouldn’t graze. “The grass was as hard as wire and the stock would stand at the gate and bawl at me if I went near them. I would have to move them by midday or they wouldn’t eat anything.”

Within five weeks of applying Vaughan’s recommended coarse agricultural salt at 40 kg per hectare the cows loved the pasture.

Another client applied salt instead potash and said, “In spring the grass had been so hard it was sticking between the cows’ teeth. Some were getting so bad that the roots of the teeth were starting to show on the gum. He would pull grass out of their teeth when drenching them for bloat. This no longer occurs, and the grass is much softer now. Bloat has reduced and pastures are now being grazed more evenly.”

Despite these and many others, at the Ruakura No 2 Dairy field day in March 1992, a stand on autumn fertilising named by MAF soil scientists displayed a board listing useful and useless fertilisers. Included in the useless list for pasture was salt (sodium chloride), magnesium, zinc and boron! They have since learned a little, but not all. For 20 years line has been of their list, and LimeMagPlus is not understood, both costing 90% of NZ farmers billions collectively.

If severely deficient, salt can be sprayed onto sheep pasture, because sheep don’t drink much water, but do need salt, especially if potassium is above 2.5% in pasture leaves. See Sheep > Barerings.

In New Zealand, depending on quantity, the salt from deserts which has not been leached by rain is about four times dearer than NZ salt from Blenheim which has just gone up by $50 a tonne to NZ$270 in the Waikato.

Low sodium levels in soils increase the leaching of potassium (K) which, at $850 per 1,000 kg of potassium chloride is costly.

High K levels in New Zealand soils are common because of the inaccuracy of 75 mm deep soil tests that then cause unpalatable, hard ryegrasses which pull out.

High K also reduces animal appetite and causes poor digestion and lower production. Salt at 50 kg per hectare and LimeMagPlus at between 4,000 and 5,000 kg per hectare, reduce the pulling and other ill effects of high K. Analyse pastures and then use LimeMagPlus Nutrient Planner to get exact amounts from its columns Y and Z.

Low sodium levels cause dry, shaggy coats, shivering in cold weather and suffering in heat, 18% lower milk production (an AgResearch trial confirmed it) and poor reproduction. Low sodium can also lead to downer cows, which are sick, affected by milk fever and can’t stand up after calving, even after treatment for milk fever. A deficiency of selenium, zinc and/or boron can accentuate it and/or cause more severe symptoms.

Fertilising with 30 to 50 kg kg per hectare (depending on the pasture mineral analysis) of coarse (to reduce leaching, which salt does) agricultural salt twice a year mixed with fertilisers or in LimeMagPlus, and feeding Solminix or fine salt to animals, preferably in the drinking water, provides a lot more minerals than fertilising with fish or seaweed and a lot more completely because salt has all the minerals and the right form.
with fertiliser or lime, and costs nothing to spread with other products.

The best and cheapest dispenser I know of is from Cook & Galloway, Hamilton, NZ.

http://www.cookandgalloway.co.nz/ Also read Human Health Elements > Salt.