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Copper is an essential trace element vital for animals, and legumes and their nodulation. It helps with body and bone strength, resistance against some illnesses such as mastitis, and it gives pigmentation to hair. See heifer on right below. Dark coloured animals show Cu deficiency sooner than light coloured ones. Too little adversely affects health and allows bones to become brittle and too much Cu can kill. Excess copper from the diet is stored in the liver and is released into the blood as needed for regular body functions. The circulating copper level can remain constant regardless of the amount of excess copper accumulating in the liver. This makes blood impossible to ascertain an animal's copper status.

Toxicity then results when stress such as severe weather, disease or transport (shipping) causes the excess in the liver to release copper quickly into the bloodstream with rapid and severe consequences.

Cu helps the absorption, storage and metabolism of iron and the strengthening of bones.

The symptoms of a copper deficiency are similar to anaemia from iron-deficiency, and a lack of colour in hair, which makes black hair go brown, or grey on humans.

Affected sheep are thin, sluggish, tired and extremely thirsty. This deteriorating situation results in shock, prostration (lying flat) and frequently death. Surviving sheep should be treated to inactivate the copper, usually with a drench of ammonium molybdate, zinc and sodium sulphate.

Much of New Zealand and other countries are low in copper that, even if pasture levels are optimum and copper is not fed, some cattle will lack the correct colour in their hair and show it. Feeding Solmin which has nine minerals overcomes this and other deficiencies and reduces internal parasite infestation. After I obtained natural copper from a teaspoon of Maple Syrup sweetener in some drinks on most days, some of my grey hair became my original brown hair.

Copper deficiency is easy to see in the hair cattle, and is a free and accurate way of measuring it because the whole herd can be checked at not cost. The vets' method is time consuming and costly using the liver. The heifer on the left was on Hamilton Clay loam fertilised by a fertiliser company rep and without soluble minerals in the water.

The cow on the right is low in copper, which is one of the most important elements in the body helping at least 10 enzymes. These effect bone and connective tissue development, maintenance of nervous tissue, pigment, red and white cell development and overall growth. It also helps the reproductive performance.

Her low hanging tail indicates that she is low in selenium, and her sad eyes indicate being unwell and possibly low in magnesium. The jaundice (yellowing) between the front legs indicates liver damage that could be from Facial Eczema. Her dry nose and lack of black colouring indicate low sodium, and the hair on the top of her neck (a mane which cattle should not have) shows a lack of cobalt. If healthy, her head would be held well above her back line and she would not be so thin. She is a big high producing cow, so needs more minerals than a small low producer. Big high producers drink more water, so with soluble minerals I the water they get more.

This is the same herd 18 months after I started advising correct liming, correct fertilising, and correct feeding a balanced nine element Solmin mineral mix in the drinking water. Look closely at her tail where it leaves her body. Adequate selenium gives it

strength to keep clear of the body, so muck is not spread on to the tail and body, as in the cow above.

The dense pasture with plenty of clover shows good liming, fertilising and grazing.

The small amount of perennial ryegrass seeding is no problem. It will help keep pastures dense and will be eaten if some roughage is needed, if bloat occurs or pasture gets too short. Theoretical scientists



will say it should be topped, but it will get eaten by animals wanting roughage to go with the lush pasture, and in droughts, meanwhile if any seeds, it will thicken the pasture.

It costs only NZ\$13 per hectare (2.47 acres) to reduce Cu deficiency, by adding 3 kg of copper hydroxide lump free 24% Cu per hectare to the fertiliser. Breeds of cattle and sheep, and families within breeds vary in their requirements of Cu and the differences can be quite a lot. Aberdeen Angus need more than most other breeds, which is no need to change breeds. After 50 years of consulting, I believe it could be easier to get some farmers to change their spouse or religion than their breed of animal.

For cows to be healthy under winter conditions and during the spring high production period, they need to build up the Cu levels in their livers before winter and be adequately supplied throughout winter. This is very important. To help this, apply fertilisers with Cu in autumn and feed a good soluble mineral mix such as Solmin. If this is not done low conception rates can follow. Copper deficiency can be due to a combination of problems such as high molybdenum (Mo), high sulphur and excess iron (Fe). High Mo and S in significant amounts, such as in ingested soil or high-sulphur water, can bind copper and make it unavailable for absorption by the animal. Iron in water, soil from grazing too short, drought affected or mud covered pastures, or even as iron oxide in some trace mineral supplements, can all reduce copper absorption by animals. Grazing animals almost never need Fe supplemented because they eat some soil which has it.

Cows low in Cu at calving are more likely to have mastitis. Check the livers of culls. It should be L:Cu 900 nmol/kg. See

Liver tests from slaughtered animals can determine the animal ill-thrift, but unfortunately blood tests are not as accurate as we would like. They show the actual conditions at the time of taking them, rather than on the long term situation. A liver analysis gives a more accurate assessment of the some levels, especially copper. A soil analysis is like a blood one, while a pasture analysis is of more value, in that it shows what the pasture got out of the soil over two to four weeks, and what the animals are getting, or not getting.

For optimum conception rates, all levels should be optimum, especially zinc, copper and manganese.

The dietary copper required is best expressed as a range, rather than a specific value. Even so, these values are conditional and adjustments may be required for individual situations. With adequate molybdenum, a dietary copper range of 12-36 mg/kg of ration dry matter, or parts per million, is specified for sheep (Underwood and Suttle, 2001).

To minimise the risks of copper deficiency and toxicity it is important to become familiar with copper and molybdenum levels of purchased and home grown feeds, including pasture. Sheep are much more susceptible to copper toxicity than other livestock, so be cautious when feeding products and ingredients that are not specifically formulated for sheep. Cu is a poison so treat it with respect, but applying copper (Cu) makes animal farming on low Cu soils possible.

Driving around New Zealand and other countries, one can still see thousands of grazing animals like this Aberdeen Angus bull showing copper deficiency. It had been just brought onto the farm to serve these Hereford cross Friesian heifers

Black hair as in Aberdeen Angus needs more copper than lighter coloured breeds.

New born calves' livers should have a Cu level of 3,000 to sustain them until eating solids, because milk has very little Cu. This high figure sometimes frightens vets who don't know about it. The foetus takes copper from the dam, so cows fed low Cu diets can be severely deficient at parturition when the udder is particularly vulnerable. See spreadsheets > Blood & Liver levels.

Adequate selenium helps copper retention in animals, and adequate copper helps selenium retention.

Parasites and insufficient feed can get the blame for the ill thrift, when the real reason can be low Cu (and/or a deficiency of other minerals). However, parasite infestation also exacerbates animal low Cu problems. Millions of animals, sheep in particular, have been drenched for internal parasites because they were not thriving or were scouring, when the problem has been low Cu, low boron, selenium, and/or low cobalt, or other mineral deficiencies - even low sodium (salt). When normal drench rates have



not cured the scouring or ill-thrift, drenching rates and frequency have been increased. The result has been sheep becoming resistant to worm drenches. Many people have known this for 40 years. I did trials, and wrote about it in 1987 and many times since. It is a pity that vets and AgResearch didn't look for the simple solution, instead of being led by the drug companies selling worm drenches, a fault that some medical doctors also have. A good soluble mineral mix should be fed in the drinking water, because doing so is cheaper than drenching for internal parasites (worms). It costs nothing because the animals (especially young stock) grow faster, eat less, and need less worm drenching.

Optimum levels

Pasture Cu, and other levels, should be measured twice a year, but at least annually, and if Cu is lower than 0.13 mg/kg for cattle (sheep 8 mg/kg) then copper hydroxide (24% Cu) should be applied with lime or fertiliser. This is lump-free and slow release, so doesn't leach as much as the Cu sulphate. It is not soluble in water so is not suitable for drenching or dispensing in water.

If fertilising with Cu sulphate, make sure it is lump free and thoroughly mixed in the lime or fertiliser. Spreading lumps is wasteful and, if eaten by craving animals can kill them (especially sheep), or damage their intestines.

Copper Hydroxide is 24% Cu and has no lumps that animals can eat and poison themselves, especially sheep.

Cu application rates depend on molybdenum (Mo), sulphur and Cu levels. Cattle-pasture Cu levels should be about 13 mg/kg as long as sulphur is not over 0.4% and Molybdenum is not over 2 mg/kg. If S is lower than about 0.3% and Mo lower than about 0.5 mg/kg respectively, pasture tissue Cu can be about 11 mg/kg without concern, but it is best to have all levels in the optimum range which are S 0.40%, Mo 1.5 mg/kg and Cu 0.13 mg/kg.

Mixed pasture Cu levels for sheep should be lower, even down to 7 mg/kg, and for Dexcel and Finnish sheep even lower. When grazing sheep with cattle, avoid getting the pasture levels too high and if necessary for the health of the cattle, supply a soluble mineral mix (SMM) in the drinking water. Sheep drink little except when on dry feed and in hot weather, so won't get too much Cu even if drinking treated water. Non-Cu fertilised paddocks for sheep may be necessary.

One reason that sheep need pastures with lower Cu levels is that they eat more clover than grass because they like short clover, and they keep pastures shorter which gives a higher percentage of clover. White clover has 30% more Cu than perennial ryegrass, and 60% more than fescues as shown here from samples I took from the same paddock. Goats need about 13 mg/kg Cu.

Optimum cattle copper levels in pastures

White clover	16 mg/kg	Sheep 12
Ryegrass	13 mg/kg	Sheep 7
Low Endophyte tall fescue	9 mg/kg	Sheep 7
Cocksfoot (Orchard grass)	13 mg/kg	Sheep 7

Keep sheep pastures at about 8. Some sheep developed on low copper areas, need less.

Seasonal variations in Cu in pastures are insignificant.

Monitoring Cu levels in livers is important to avoid excesses and deficiencies. The liver is the storage organ for Cu and has about half the body's total, keeping blood levels reasonable until it runs out, which takes up to three months on low Cu diets.

Blood is not accurate for measuring copper levels, and only show what is being moved around the body at the time of sampling. Levels fluctuate, rising within a few hours of consuming Cu from a lick or an SMM in drinking water. Levels can drop in late pregnancy unless adequately supplied.

Grazing cattle benefit from supplementing Cu in Solmin for most of the year, even when pasture levels are 13 mg/kg, but more so on peat from the end of the autumn until spring calving, when 500 kg Cu-deficient cattle need an extra 1 to 2 grams of copper sulphate per head per day from the end of autumn (after facial eczema zinc is stopped) until spring calving, and yearlings need about half a gram. Negative people will tell you that very little of supplemented Cu is absorbed by cattle, but it is not wasted because it goes into the soil. Very little magnesium is absorbed, but don't try to calve during a typical winter on high potassium pastures without Mg.

Cu bullets cost more, but work well, if it is the only deficient element, which is almost never. Don't

use maximum size ones on young animals. Consult your vet if in doubt.

Animal deficiencies

Young animals are more likely to suffer low Cu than mature animals. Deer are very susceptible to low Cu, while sheep are not and can suffer excesses, even from grazing lucerne for too long.

Copper deficient animals are at greater risk for infections and parasites than are copper supplemented ones.

Young animals are more likely to suffer from low Cu levels than mature animals. Goats and deer are very susceptible to low Cu, most sheep breeds are not, and are easily over-supplied.

When low, any animals can suffer long bone fractures for no apparent reason, cracked hooves in adults, sudden deaths, and fragile bones, especially in newly born animals.

When low, animals can suffer -

- Long bone fractures for no apparent reason.
- Cracked hooves in adults.
- Sudden deaths.
- Fragile bones, especially in newly-born animals.
- If a pasture analysis and/or liver test show Cu is low, apply copper hydroxide (lump free) with fertiliser at 3 to 5 kg per hectare and feed Solminix soluble mineral mix in the drinking water if possible.

Feeding pasture that is high in Mo and sulphur can increase the Cu requirements twofold. High or very low levels of Mo in pasture can make it difficult for animals to absorb Cu, so they scour. Low Cu and high Mo can cause teeth to grow long, and may also contribute to long hoof growth, especially on soft soils such as peat.

Low energy feeds can reduce Cu absorption. Examples are; kale at 5 mg/kg Cu, and grasses such as fescues at 9 mg/kg are low in Cu.

If Selcote Ultra (slow release Se containing 1% Se) is applied at 1 kg per ha with Single Superphosphate at normal rates of 500 to 700 kg per ha, sulphate S will be 55 to 77 kg per ha which is too much, so lowers the Cu and selenium levels severely, at the expense of animal health. This is an annual occurrence on many farms, but doesn't occur at all on those farms using reactive phosphate (RP) at any application rate, and elemental S (100% S) at no more than 20 kg per hectare. Fortunately for the animals, sulphate S in Superphosphate leaches fairly quickly. Unfortunately it takes potassium and other sulphate products with it (Indian finding) and, more unfortunately, it pollutes waterways (Massey University trials I asked them to do). Single Superphosphate is apparently no longer made in USA, but is still the base of most fertilisers in NZ.

Cu deficiency in peats and pumices is well known, but many soils previously not deficient, are becoming so, as the top 15 cm of soil is farmed out (mined) by heavy bad conventional fertilising and high animal production. This was seen in Eastern Waikato, where 400 herds had the livers from cull cows tested in the early 80's and 30% were too low in Cu.

As plants mature, the percentage of many trace elements including Cu tend to decline, especially in grasses. Cu can decrease in mature cocksfoot from 13 mg/kg to 8 mg/kg, and in clovers from 16 mg/kg to 11 mg/kg. Be aware of this with deferred grazing of long pasture in summer.

Pregnant animals need about twice the normal Cu in winter months because they need Cu to supply calves and lambs with Cu to form bones and to avoid them being brittle at birth and sometimes breaking legs.

Lambs on the steep hills of Poverty Bay in the East Coast of the North Island of New Zealand were breaking legs soon after birth. It was traced to low copper levels. Copper sulphate was spread at 3 kg per ha with the fertiliser and leg breaking ceased.

High Mo levels in wet winter pastures lowers the absorption of Cu in the digestive system, so fertilise to maintain pasture levels at 12 mg/kg for cattle and 8 mg/kg for sheep.

When dry cows are on their typical winter maintenance ration of 7 to 9 kg of pasture DM per day, depending on size, they don't get enough of many elements, especially Cu. That is why a good soluble mineral mix gives such good results then. Start correcting Cu levels as soon as facial eczema zinc use stops, and continue supplementing during winter until liver levels are optimum.

Copper deficiency causes scours, poor cycling and conception, poor uterus cleaning, stiff hair lacking sheen and colour, especially around the eyes. Clover nodulation is low as is animal growth.

Symptoms of Cu deficiency

- Mo scours can occur when it gets too high because of applying lime without copper. Analyse ryegrass to get levels right and to check selenium to avoid scours because it is deficient.
- Dry colourless hair, especially around the ears. Hair becomes stiff and loses its original natural colour. Colour loss usually shows up first around the eyes and edges of ears. Black hair goes brown, red and brown hair goes dull, and greying occurs, also in people. Read Human Health > Copper. Loss of hair around the eyes can be from zinc deficiency.
- Sheep grow less wool, which is then straight and “steely” with little crimp and lustre. Lambs and deer can have paralysed hind quarters.
- Deer and cows cycle, but conception is low.
- Low fertility, delayed cycling, and embryo death at between 30 and 50 days of gestation.
- Retained placenta and poor uterus cleaning. Low selenium does the same.
- Reduced birth weights.
- Anaemia.
- Loose dung that can contain bubbles.
- Lameness or a stiff gait in calves.
- Swelling of the leg bones above the pastern (area between hoof and fetlock).
- Increased mastitis (USA finding).
- Cattle remain in moderate to poor condition, even though pasture quality and amounts are OK.
- Reduced appetite.
- Cu deficient cattle are at greater risk of infections than copper-supplemented ones, but animal supplementation with Cu more than in good mineral mixes should not be made without knowing animal liver levels. Blood levels are not a reliable measure because it only transports copper so Cu goes up and down.
- Low Cu and low cobalt together cause serious animal health problems and internal parasite infestation. Low selenium makes things even worse.
- Severe deficiencies can cause dramatic deaths from ruptures of a major blood vessel, affecting the heart.
- Reduced animal growth especially in winter.
- Impaired immune systems so animals become more susceptible to other problems.
- Young animals are more likely to suffer from low Cu levels than mature animals. Goats and deer are very susceptible to low Cu, while most sheep breeds are not, and are easily over-supplied.
- When low, any animals can suffer long bone fractures for no apparent reason, cracked hooves in adults, sudden deaths, and fragile bones, especially in newly born animals. Vets should take liver samples from corpses.

Deficiencies can be accentuated by -

- Low Cu levels in pasture.
- Low Cu levels in other feeds such as maize if a lot is fed.
- Low selenium, cobalt and copper levels in pasture together, can cause much worse effects.
- Animals grazing brassicas, root crops such as turnips and swedes consuming soil which lowers Cu absorption.
- The last two months of pregnancy when supplying the foetus.
- High Mo, sulphur, nitrogen (crude protein), manganese and/or zinc in feed.
- Using zinc for facial eczema control.
- High iron levels in water and/or soil.
- Parasites.
- Single superphosphate (0-9-0-11), or single superphosphate mixes, applied in autumn or spring, with their high amount of water soluble phosphate and sulphur, reduce pasture uptake of Cu for two to three months. This doesn't occur with Triple Super (2% S), or the best reactive phosphates like Gafsa with elemental sulphur at about 15 kg per ha, because it releases slowly. If Cu pasture levels are high don't apply any more. See Spreadsheets > Ryegrass Mineral Analysis.

Cows can die and milk fever get blamed, when it is not.

Animal excesses

The NZ Wallaceville Animal Laboratory in the 1980's reported diagnosing more cases of animal deaths from excess Cu, than deaths from deficiencies.

An excessive build up of Cu in the liver can cause it to fracture and overflow, causing Cu to get into the blood, creating jaundice and blood in the urine.

Excessively high Cu in the blood after reaching the brain can kill animals instantly. It has occurred in USA from over-feeding dry copper sulphate in concentrates by mistake. Feeding dry copper sulphate is more toxic than in drinking water, possibly because animals get it over a shorter period in a more concentrated form. Cu is more absorbed by animals from dry feed such as hay, than from sappy pasture that passes through the animal's system more quickly. Sheep can die from Cu toxicity after eating only lucerne hay for a few months. It has 18 mg/kg of copper which is nearly three times the optimum amount for sheep.

Insist on copper hydroxide which is lump free and has 24% Cu.

Avoid grazing pasture until Cu fertiliser is well washed off it. Lumps of copper sulphate in paddocks can be eaten by animals and poison them. Animals can crave Cu when it or other minerals are deficient.

Young calves can die after consuming as little as 100 mg (one tenth of a gram, i.e., one fiftieth of a level teaspoon) of Cu sulphate. However, a good SMM is beneficial to calves after a week or two of age. It can be added to milk, or fed in a little warm water after the calves have finished their milk. This cleans the feeder. Young calves should not get more than 4 grams per day of SMM containing Cu. Follow instructions carefully.

As seen, copper is an important element for good health, but as with all elements, be careful with it. At the two year agricultural college course I attended, the sheep master got us all together every second year and injected copper into an old cull ewe twice, and within minutes she dropped dead. This demonstration was to engrave in our minds how careful we had to be when treating animals, i.e., not to inject one twice by mistake.

Vets know to avoid accidentally injecting themselves with Cu. If they do, they rush to a doctor.

Palm Kernel Extract (PKE)

This is a variable product. Its copper content can be 34 mg/kg of dry matter, which is more than twice the optimum for cattle and four times that of sheep. Googling for 'PKE cow deaths' found it has happened in New Zealand and overseas. An article published in [Gribbles Veterinary Newsletter, Labtalk](#), highlighted the potential for sheep and cattle to develop copper toxicity from PKE. They reported seven cow deaths from excess copper on two farms. Their blood became very thin and didn't coagulate.

Why do some die?

Animals (and people) can usually survive single toxin excesses or deficiencies, but can not always survive double whammies of toxins and/or infections.

Over-consumption can occur from grain feeding bins where all animals can't access it them at the same time, so some eat twice as much as others. No more than 2 kg of PKE should be fed per cow per day, but this is impossible to control with bulk bins in paddocks, also because some like it and some don't.

If one animal shows Cu excess symptoms others can be affected, so all should then be handled quietly to avoid becoming stressed. Deaths can occur even after the source has been removed. 1.5 grams of copper sulphate drenched once can (not will) kill a cow. Drenching three grams of copper sulphate per cow per day killed 40 Waikato cows, while three grams of copper sulphate spread over a day in drinking water may not be toxic.

Cu is also a cumulative poison, in that the animal body is unable to excrete it easily, so even slight excesses over a period can build up in the liver and become toxic.

A client had two cows scour severely for the rest of their lives, after excess Cu was given to them on the advice of a vet who believed that most animal health problems were from low Cu. The intestines' villi (fingers) had been permanently damaged, as can occur with coccidiosis (and less severely from gluten in humans).

Another client invited me and a vet to come to downer cows that could not stand up. He had been

feeding PKE, and bad mineral mix, and concentrates from a company that was not up to it. The concentrates had high levels of heavy metals from cheap imported additives

There is evidence that injecting Cu prior to, or during the mating period, can adversely affect fertility, so avoid injections and supplying excessive copper at this time. Correct the levels by supplying Cu metered in the drinking water through a dispenser well before mating and well before giving zinc for facial eczema control because excess zinc suppresses copper.

I would not feed PKE. A few dead cows make it costly. Also it upsets people concerned about the growers clearing and burning the bush at the expense of some wild life.

Excess Cu symptoms in all age animals include -

Depression, anorexia, abdominal discomfort (kicking at stomach) and jaundice from a damaged liver.

Severely damaged intestines causing continued scouring, sometimes all their life, as happened to one of a client's cows that had been over-drenched with it.

Damaged liver & red blood cells, causing jaundice and the possibility of death within a day.

Overloaded liver if the levels rise to 3,000 L:Cu nmol/kg.

Soil & plant deficiencies

Cu deficiencies cause clovers to have poor nodulation & growth, leaves are greyish green, have yellow or brown blotches (not spots), are severely limited in growth, then wither, die and fall off. Maize plants are stunted and the leaves go pale yellow, break or turn backwards with tips dying.

Aluminium, which is high in many subsoils, can affect peat when it consolidates down to mineral soils, because it lowers Cu uptake. When Cu is low, zinc and Mo levels rise. Oats and brassicas require more Cu than other crops. Brassicas don't take up much Cu, so supplementing grazing animals may be necessary.

Cu is highest in pastures in summer and autumn, but note that animal absorption at this time can be suppressed by zinc treatment for facial eczema.

Dry cows may need extra Cu because they get so little pasture (say 8 kg DM per day) that they get only 8,000 grams (times 13 mg/kg equals only 0.1 gram). Typical high winter Mo levels can reduce the usefulness of the Cu even more so additional Cu should be applied.

Repeatedly applying cattle effluent from yards on to the same soil lowers Cu levels. Mixing copper sulphate with cattle effluent reduces its smell from the hydrogen sulphide, so kills two birds with one stone, but monitor pastures regularly to avoid excesses. Pig effluent can increase levels because pigs are fed so much Cu to promote growth.

For pasture, most peats require 10 kg per ha of copper sulphate initially, then 2 kg per ha per year, decreasing over time as pasture levels increase. The more acid the peat, the greater the response in some crops to higher applications of Cu. Some vegetable cropping farmers apply more. On other soils, apply 3 kg per ha if cattle pasture Cu level is below 10 mg/kg. Apply more if Mo level is above 2 mg/kg. On sheep-only pastures apply none, unless herbage is down to 7 mg/kg or if Mo is above 3 mg/kg, and then only 1 kg per ha of copper hydroxide.

Soil & plant excesses

Excesses in peats and grass pastures are unlikely, but care should be exercised, especially in orchards where Cu sprays have been used and pig manure is spread because it can be very high in Cu. Sheep grazing the resultant high Cu pastures could suffer. Young cattle and sheep are more susceptible to Cu toxicity. Always be sure that all Cu is well washed off plants before grazing.

If Cu is high and Mo is low (below 1 mg/kg), apply lime if Ca is needed to increase Mo levels, otherwise apply Mo, but only as a last resort because it is hard to lower Mo, especially when subsequent regular lime applications are necessary.

Sources

Cu chelates are promoted with claims of benefits, but on equal costs comparisons, there are none. Any extra copper sulphate used ends up in the soil, so is not wasted. Some use flowery meaningless statements, but give no costs or comparative financial benefits. Read Chelation in Human Health Minerals.

Facial eczema and copper

For facial eczema prevention, dairy cows are fed 10 grams of elemental zinc a day which lowers copper absorption. However, don't feed too much Cu at the same time because Cu depresses Zn. See [GrazingInfo > Animal Health > Facial eczema](#). Facial eczema spores apparently multiply faster and are more toxic when Cu is present, so avoid extra Cu in the form of injections or bullets when using zinc to prevent facial eczema. Don't give extra Cu to facial eczema affected animals because Cu is more toxic to facial eczema damaged livers. This cautionary comment will seem superfluous to careful people, but regularly one hears of animals dying from overdosing or poisoning from some elements.

Ruakura Animal Research Centre staff in 1990 said that the amount of Cu in DeLaval Feedtech soluble minerals doesn't suppress Zn during the facial eczema treatment period. Animal health improvement when fed DeLaval Feedtech mineral mix, confirmed this.

Conclusion

As seen, copper is an important element for good health, but as with all elements, be careful with it. At the two year agricultural college course I attended in 1946/7 in South Africa, the sheep master got us all together every second year and injected a normal copper injection into an old cull ewe twice, and within minutes she dropped dead. This demonstration was to engrave into our minds how careful we had to be when treating animals, i.e., not to inject any in the race twice by mistake.

Be warned

In 2008 dairy farmer Bruce Paton gave up injecting his 1,800 dairy cows with shots from both hands - one copper and one vitamin B12, presumably because he had not fertilised enough with copper, and cobalt which allows ruminants to make their own B12.

The trend from fertilising with deficient elements to injecting them is expensive and an overall backward step pushed by the highly profitable medical companies and vets and accepted by some research centres such as Ruakura - AgResearch - DairyNZ. See [Elements > Cobalt](#).

The 39-year-old Northland, NZ farmer was leaning over the rails injecting copper with one hand and vitamin B12 with the other, at 200 an hour, dropped the copper injector and it swung down on its hose and into his knee. The knee hurt so when finished he called his doctor, who had no experience with such an injury, so phoned the local vet club who phoned the supplier, who said that he would need surgery - and soon. The injector had been set up to put 2 ml of calcium copper edetate under the neck skin of each cow, and Bruce estimated he had received perhaps 0.5 ml when the needle jabbed him - far short of the 2 grams he had heard would be a lethal dose. The surgeon removed flesh around the needle entry point and cut a hole in the knee to insert a camera and check no copper had penetrated the joint.

Other farmers have given themselves accidental copper injections. One, who had injected his finger and got it lanced a few hours later, was told that he would have lost his finger if treatment had been left much longer.

The manufacturers said most farmers failed to read the fine print which had a health warning that copper livestock injections can cause severe tissue degeneration, or even gangrene in humans.

Fertilising according to pasture mineral analyses and feeding Solminix in the water would have avoided the injecting and danger and given healthier animals.

After taking 2 mg of Cu every second day for two months at age 78, some of my hair colour improved to its original light brown colour.

Further Reading

See [Human Health Elements > Copper](#).