

The Role of Trace Elements

Trace elements are essential to the normal functioning of an animal's metabolism, so that if there is a deficiency or an oversupply, health problems can arise. Trace elements such as copper, zinc, selenium, iron and manganese play an integral role in the immune system. Hence the claims by manufacturers of some trace element supplements that by using their product you will see improvements in cell counts, mastitis, post calving infections etc etc. Unfortunately it is not that simple and despite their importance, trace elements are not a Factor X which will solve all your animal health and reproductive problems.

Other important functions of trace elements include growth, fertility, red blood cell production, hair coat growth and pigmentation, and energy, fat and protein metabolism. In other words, they are vital to a vast array of body processes which adds to the complex and confusing trace element picture. Fortunately, in our pasture-based systems adequate levels of many trace elements are supplied just through grass.

Most of you will have administered minerals to your stock in some way at some stage but, do you know if what you do is effective? Just supplying these essential trace elements to your animals doesn't mean they are working the way they are supposed to. Why? Unfortunately, many of the minerals interact with each other in either a complementary or negative way, depending on the relative quantities of each in the diet. The only means of evaluating these levels is by soil and pasture analysis which also helps identify any possible mineral interactions. Analysis of your water supply will also help complete the picture. This information also helps advisors decide which method of supplementation best suits your situation. For instance, it will not be cost-effective to put copper on with your fertilizer if soil molybdenum and sulphur levels are high, as they make dietary copper less available to the animal ie a negative interaction. The preferred method would be by copper injection or copper bullets, but under these circumstances it may be necessary to repeat treatment sooner than you would on other farms.

The only way to evaluate the success of what you are doing on your farm is by ongoing monitoring of animal samples. In the case of copper and cobalt, this is best done from liver samples (chopper cows or liver biopsies on live cows). The liver is like the fuel or storage tank for these 2 minerals, whilst the blood represents the fuel line and gives you no idea of how much fuel is left in the tank, unless it is also running low. In the case of selenium, monitoring blood levels is a good indicator, but liver levels are also meaningful.

It is worth noting that seasonal variation in trace element levels in cattle is normal. Testing or monitoring is best performed during the most susceptible time of year ie Winter/early Spring for copper and selenium, and Summer/early Autumn for cobalt. The cobalt content of pasture is lowest during this period, whilst in the case of copper, not only do pasture levels fall in Winter, but molybdenum and sulphur concentrations increase and soil contamination of pasture is highest at this time of year which can result in high iron and manganese intakes. Iron, manganese, molybdenum and sulphur all interfere with copper absorption, as do zinc and calcium.

To grow pasture we all strive for improved soil fertility, but the dilution effect of increased pasture growth can decrease concentrations of selenium, copper and cobalt. Increased soil pH tends to decrease the absorption of copper in the animal through increasing molybdenum content of pasture, whilst applications of molybdenum with fertilizers can also induce copper deficiency. Increased soil sulphur levels not only interact with molybdenum making copper less available, but may also decrease selenium concentrations in the plant. In other words, the whole trace element picture is very complex and the best way of making informed decisions is by basing them on soil, pasture and animal monitoring.

We are often asked about zinc supplementation for control of lameness. The value of additional zinc in these circumstances is debatable with many other management factors being far more significant. Also, green grass and grain are very good sources of zinc. It is worth noting that excessive levels of zinc in the diet can interfere with copper, phosphorous, iron and manganese absorption, so ad hoc use of zinc may create other problems. At best, measuring zinc levels in animal tissues is unreliable and we don't believe we have ever seen evidence of zinc deficiency anyway.

All of the above issues are not insurmountable problems; there just has to be a bit of science behind which trace elements you use and when.