Cobalt (Co) is a constituent of Vitamin B12 and it is a deficiency of this vitamin which can cause problems. Deficiency of vitamin B12 leads to a lack of appetite and poor looking sheep. It is most commonly seen in growing lambs where it can easily be confused with worms. To complicate matters, high worm burdens can actually impair absorption of vitamin B12 from the rumen, making the disease worse (sometimes referred to as ‘pining’). Lambs severely affected with vitamin B12 deficiency will become anaemic and can die. In adult sheep cobalt deficiency can be responsible for infertility or the birth of weak lambs. Soils of extremely low (<5) or high (>6.5) pH or high iron (Fe) or manganese (Mn) content can lower the available cobalt because it becomes ‘fixed’ in non-available forms.

Cobalt deficiency can be diagnosed by blood or liver samples but neither is 100% reliable. Response to therapy is the best way of diagnosing the disease. The ability of sheep to store vitamin B12 is not very good. The most characteristic form of deficiency of vitamin E/selenium tends to cause the same problems. The most characteristic form of deficiency of vitamin E/selenium is ‘white muscle disease’. It usually affects lambs and can cause weakness, stiffness and rapid breathing and sometimes sudden death (due to causing weakness of the heart muscle). In older animals deficiency of vitamin E/selenium tends to cause general unthriftiness and can affect fertility.

Severe cases of white muscle disease can be diagnosed on post mortem as the muscles are extremely pale. Blood samples can be useful in diagnosing the condition.

If needed, selenium can be supplemented in the form of boluses, mineral licks, drenches or applying selenium directly to the ground. Subcutaneous injection with selenium (in ‘depot’ form) is the method most commonly used in severely affected groups of animals. Several worm drenches are available with selenium added but the actual amounts included should be checked. Care should be taken with supplementing selenium where there has not been a problem confirmed on a farm as it is possible to overdose and cause toxicity. Signs of selenium poisoning include colic, watery diarrhoea, collapse and sometimes death.

Iodine

The UK naturally has high levels of iodine in its soil. The usual cause of iodine deficiency in this country is by exposure to chemicals which inhibit the uptake of iodine. These chemicals are found in brassicas such as kale and legume crops such as clover. Cereals and root crops are also a particularly poor source of iodine. When any of these feeds form a significant part of the ration, particularly in late pregnancy, it is likely that supplementation may be required. Low temperatures can increase the requirement by the body of iodine therefore exacerbating the effects of a deficiency.

Sheep are quite susceptible to iodine deficiency compared to cattle. Signs include infertility in ewes, loss of libido in rams, poor wool growth and reduced weight gain in growing lambs. Iodine can also cause late abortion of lambs or the birth of weak poor doing lambs. The aborted or weak lambs tend to have an enlarged thyroid gland which can usually be easily seen in the neck. In aborted or newborn lambs diagnosis is by the size of the thyroid gland. In other animals diagnosis is by blood samples. Measuring iodine content of tissue samples, eg liver, is possible but tends to be quite expensive. Measuring blood thyroxine (a hormone containing large amounts of iodine) is far cheaper and is the usual method of diagnosis. Supplementation with iodine is possible in the form of mineral licks, boluses or drenches in included in wormers.

Selenium

Selenium and vitamin E work closely together and a deficiency of either tends to cause the same problems. The most characteristic form of deficiency of vitamin E/selenium is ‘white muscle disease’. It usually affects lambs and can cause weakness, stiffness and rapid breathing and sometimes sudden death (due to causing weakness of the heart muscle). In older animals deficiency of vitamin E/selenium tends to cause general unthriftiness and can affect fertility.

Copper

Deficiency

Copper is usually present in adequate quantities on pasture but sometimes events in the rumen can mean that it is not absorbed particularly well. In the UK low copper levels in sheep are usually seen where there is a high Molybdenum (Mo) content in the soil.

Signs of copper deficiency include loss of wool crimp ('steely wool') and lighter coloured wool (in coloured breeds). In young lambs where the ewes have been copper deprived the sign is swayback - uncoordinated lambs which tend to ‘sway’ their back legs. Some lambs can be so badly affected that they cannot get up. In older lambs deprived of copper the signs are slower weight gain, anaemia and fragile bones.

Diagnosis of copper deficiency is usually on bloods or post mortem examination of the liver or kidney.

Treatment of copper deficiency is by supplementation with either drenches, boluses or injections as with cobalt deficiency. There is some risk with using injections though, including reaction at injection sites and acute toxicity, potentially causing death.

Toxicity

Sheep are particularly susceptible to the toxic effects of copper, more so than cattle or other animals. Breeds particularly badly affected include North Ronaldsays, Charollais, Texels, Suffolks and some rare breeds.

Sources of copper causing toxicity include compound feeds and injections/drenches/boluses used in error. In addition, pastures grazed with pig manure can be high in copper. Compound feeds made for sheep are specifically designed to contain very low levels of copper. Copper poisoning can be sudden onset, eg after a subcutaneous injection with copper when it is not needed, or slow onset, eg by sheep being unnecessarily supplemented with small amounts of copper over a long period. In this case death may occur when the animal is stressed.

If copper toxicity is suspected to be a risk dressing the pasture with molybdenum may help to reduce that risk. In animals known to have chronic copper poisoning treatment is difficult.
Minerals – what is best for my sheep?

Correct levels of minerals and vitamins are essential for optimum health and productivity but it can sometimes be tricky to work out which ones it is that you should be supplementing your sheep with. To make things more complicated, some minerals can be toxic if supplemented in too high doses and the consequences of this could be severe.

We are often asked for advice on which minerals a particular group of sheep needs. In many cases blood samples can provide a useful indication of the levels of different elements in that group. In the case of some minerals blood samples only provide a very short term indication of what is going on and an easier way of diagnosing the problem can be to see if there is a response to supplementation.

In general, minerals required by sheep can be divided into two main groups:

1) Micronutrients – these are minerals required in very low quantities, several milligrams per day or less. These are cobalt, copper, iodine, selenium, zinc, iron and manganese.
2) Macronutrients – these are minerals required by sheep in larger quantities, several grams per day. These are calcium, magnesium, phosphorus, potassium, chloride, sodium and sulphur.

The four most important micronutrients to worry about are Cobalt, Copper, Selenium and Iodine. Zinc, Iron and Manganese are often talked about but deficiencies of these minerals are currently rare in the UK. Of the macronutrients, the ones which most commonly cause problems are Calcium and Magnesium.

The following page includes a summary of the effects of too little or too much cobalt, selenium, iodine and copper. If you are concerned that there is a problem with micronutrients in your sheep the best way to get an idea of what is going on is to take blood samples. A sample of several animals should be taken and these should be from normal animals representative of your flock, rather than sick animals. If this is carried out then treatment can be tailored to the exact needs of your sheep, meaning that they benefit from being supplemented with minerals that they do need and are not unnecessarily (and potentially dangerously) supplemented with ones that they don't.

There are several options for substituting mineral deficiencies in sheep. These include mineral licks, drenches, injections and boluses. Mineral licks are useful, but the downside is that they can result in some sheep getting far more minerals than others. Drenches are a good short term measure, but usually need to be repeated quite often to be effective so can often not be relied upon. Short acting injections need to be repeated quite often but longer acting ‘depot’ injections work well in sheep diagnosed with a specific deficiency. Slow release boluses are a useful way of supplementation as each sheep is given a specific quantity of mineral, but is important to check exactly which minerals are present in the bolus you are using.