

Introduction

Iodine is required for the synthesis of thyroid which regulates growth and the rate of energy use. Iodine is an essential element for animals that can be deficient in pastures and crops. A deficiency can cause an enlarged thyroid gland (goitre) as it grows bigger (see photo) to try to produce more iodine.



Pastures and crops don't need iodine, but animals do, to synthesise thyroid hormones. The iodine content of pastures and crops is usually too low, but varies widely, depending on the plants and the area. Most of New Zealand and a third of the USA are low in iodine, especially in the mountainous and high rainfall areas, and inland from the sea. As with salt, rain water close to the sea is higher in iodine than that in the centre of large continents.

Iodine deficiencies are more likely to occur when animals are fed forages grown on iodine deficient soils and/or crops that are naturally low in iodine, such as brassicas.

Iodine deficient ruminants can cause enlarged thyroid glands (goitre) in newborn calves which can be weak or still-born. Approximately 10% of iodine intake is secreted in milk which can cause an excess of iodine in consumers if too much is added to animal feed.

If lacking, there are many ways of supplementing it to prevent the worst problems, which are stillbirths, which often occur with goats grazing pastures without mineral supplements.

Animal deficiency symptoms

- Reduced survival rates of new-born lambs and calves, as well as reduced conception rates and milk production in cows and ewes. This may happen where clinical 'goitre' symptoms are not observed.
- Slow cycling and/or its duration.
- Difficult births.
- Dams can abort or have early or late calving by up to nine days and retained placentas.
- Newly born animals can be small and/or still-born and/or hairless or wool-less, weak and can then die.
- Ill thrift and anorexia can occur, milk production decreases and mastitis and footrot increase.
- Excessive salivation, hypothermia, coughing, nasal discharge (also caused by low selenium), runny eyes and pneumonia increase.
- Oedema in the head, neck and tongue of the newly born.
- Inability to suck.
- Thyroid glands as shown can be enlarged to three times the normal.

Goats are most susceptible to iodine deficiency. Young animals (especially kids) can be stillborn, lack hair or be unthrifty with slow growth.

Goitrogens in some clovers can lower animal iodine uptake, as do most brassicas, but deficiencies can also occur on grass and clover pastures in iodine deficient areas, when iodine levels are below 0.18 mg/kg, as occurs in many New Zealand pastures. Farming animals in low iodine areas and/or feeding problem plant species, such as brassicas, without supplementing iodine is asking for trouble, especially with goats. Supplying a good soluble mineral mix containing iodine through an on-line or Peta trough dispenser to the drinking water controls it easily in all except sheep, because they drink very little water when grazing moist pasture. They do, however, eat minerals, and have been known to smother each other when deficient and suddenly given minerals.

Some claim that oral iodine supplementation doesn't help, but perhaps it was in a lick block form, from which animals can't get enough, while some ignore them. Cornell University trials showed that block licks are not a satisfactory way of feeding minerals. Mixed loose licks are better than blocks, but neither is anywhere near as good as soluble mineral treatment in the drinking water.

Spraying milking cows' teats with iodine based teat sprays after milking to control mastitis helps, because iodine is absorbed through the skin, but it doesn't work on dry cows, so Solminix soluble minerals must be fed in the drinking water. If no other way is possible, the barest skin of cattle and goats can be sprayed occasionally with iodine. Obviously this won't work on sheep.

If iodine deficiency in sheep is a problem, use a commercial iodised oil injection. It can give protection for one year in cattle and two years in sheep.

Animals grazing root brassicas such as turnips and swedes consume some soil, so are much less likely to suffer iodine deficiency, but some soils such as peat and pumice have very little iodine. However, eating soil is not a good practice because it lowers copper and adversely affects digestion.

Calves are born with iodine liver levels six times higher than that of cows because there is none in milk, so newly borns get none until eating solid food. I mention this because, like some doctors, some vets who are against mineral supplementation were not taught about it and have not studied it. If they don't know the optimum liver levels in newly borns, and if you are feeding minerals, some vets can blame a calf death on high levels, when it is not the case.

Client John Wilson, then a mohair goat farmer at Gordonton, north east of Hamilton, New Zealand, reduced kid deaths from 25% to 1% after supplying Solminix through a dispenser all year.

Excess fluoride can suppress iodine absorption.

Animal excesses

Toxicity can occur where high levels of iodine are fed for too long. Over supply can cause long and vigorous cycling. Runny eyes (low zinc can also cause this), nasal discharge (low selenium can also cause this) and excessive salivation are the first symptoms of toxicity, followed by watery nasal discharge, and tracheal congestion leading to coughing, lowered resistance to infection, conjunctivitis (inflammation of tissues in contact with the eyeball), a reddening of the sclera (white of the eye is bloodshot), corneal ulcers, hair loss around the neck and eye and bulging or protruding eyeballs. Body temperature increases as does the heart and respiration rate. Nervousness, roughness and loss of hair, sluggish movement, reduced appetite, lower conception rates and reduced milk production can occur.

Excessive iodine causes secretion of mucus from lungs and bronchial tubes, nervousness, rapid pulse and breathing, and coughing. Large excesses of protein in the diet may also depress fertility.

Optimum levels

The optimum 75% grass and 25% legume pasture mix for animals on good healthy soils has around 0.5 mg/kg iodine, but it is hard and expensive to achieve this level because of the \$46,000/tonne price to fertilise with it, it leaches, and the uptake by pasture is poor. Iodine, when applied to peat soils, resulted in only about 4% being taken up by plants.

High levels of cobalt, calcium and/or boron, and/or applying excess nitrogen, can lower uptake of iodine by pastures. A low Ca level can also lower iodine uptake by pastures.

Farmers should fertilise with and feed salt for the reasons explained in those chapters.

Soil & pasture deficiencies

Low iodine can adversely affect animal and earthworm health, but, despite this, increasing it in soils is too expensive to justify it. There are better ways.

Deer and goats are browsers of deep rooting shrubs so get enough iodine, but, when farmed on typical shallow +/- 20 cm (8 inch) rooting pasture, can suffer from low iodine, resulting in stillborns or death soon after birth.

Low zinc levels exacerbate the effect of low iodine intake.

Fertilising with iodine is not profitable because of its high cost and because it is so water soluble that it would leach very quickly.

Soil & pasture excesses

This is unlikely unless it is sprayed on to pasture, when the increase in animal iodine levels is so slight that it doesn't pay to do so. It is better to spray it on to animals' skin, when if not required, it won't be absorbed.

Feeding it through the drinking water is the best and most accurate way.