Medical Definition of GEELDIKKOP

A serious photodynamic disease of southern African sheep due to sensitization to light following the ingestion of some plants and characterized by intense jaundice and a severe facial edema.

Heliotrope toxicity in sheep and cattle

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![Heliotrope](image)

**Heliotrope (Heliotrope europaeum)**

*Heliotropium europaeum* is often referred to as potato weed, blue weed, or common or wild heliotrope. It was introduced into Australia in the 19th century and has established in all states of mainland Australia, apart from the Northern Territory.

Heliotrope is a summer sowing annual herb that thrives on disturbed, bare or open, cultivated ground. It has branched stems, grows up to 300 mm high and is covered with coarse white hairs. The leaves, which are grey-green in colour and oval shaped, are arranged alternately on the stems and has small white flowers.

Seeds germinate in the warm, moist conditions after each late spring or summer rain, and growth is prolific where seedlings are not shaded and there is no competition from perennial plants. Fallow ground is ideal, hence it is more of a problem in wheat/sheep areas than pastoral areas. Heliotrope has enormous seeding potential and the seeds are viable for many years.

This plant contains poisons or toxins known as pyrrolizidine alkaloids. The toxins are present at all stages of growth and in all parts of the plant, including the seed.
Nature of the problem

A sheep with symptoms of Heliotrope poisoning

All animals are susceptible to poisoning. The most susceptible are monogastric species such as pigs, poultry, horses and humans. Poisoning in these species is usually caused by the consumption of cereal grains contaminated by heliotrope seed.

Ruminants including sheep and cattle are less susceptible because some of the alkaloids are destroyed by microbes in the rumen. However, because sheep are the dominant species grazed in areas where heliotrope growth is most prolific, they are the most commonly affected species in Australia.

The disease is usually chronic in nature with signs of sickness and death often delayed for weeks, months or years after the consumption of the heliotrope has ceased.

When heliotrope is eaten, the absorbed pyrrolizidine alkaloids form secondary compounds that remain in the liver producing ongoing damage. Liver damage also increases progressively with additional intakes of heliotrope.

Photosensitisation is the result of an excessive sensitivity to sunlight caused by an accumulation of phylloerythrin in the blood. This chemical is a breakdown product of chlorophyll, the pigment present in green plants. Normally phylloerythrin is removed from the body in bile, produced in the liver. Liver damage due to heliotrope poisoning retards the rate of excretion of phylloerythrin, causing a build-up of this compound in the blood and tissues (including the skin) when the intake of green plants is high. The interaction of phylloerythrin and sunlight results in skin damage resembling severe sunburn. In sheep this occurs on the non-wooled areas, and in cattle is most apparent on white-skinned areas.

In addition to the direct effects of heliotrope, there are secondary effects including pregnancy toxaemia, copper poisoning and ammonia poisoning. Pregnancy toxaemia occurs when sheep within the last six weeks of pregnancy are unable to provide sufficient energy for the developing foetus (often twins). As the provision of energy is a function of the liver, those ewes with chronic liver damage are more likely to develop pregnancy toxaemia. This condition has been a major cause of ewe deaths in the Mallee.

Copper poisoning causes sudden death, with jaundice, when the sheep are stressed. Liver damage caused by heliotrope leads to an abnormally high uptake of copper by the liver,
especially when sheep are grazed on clovers or medics which have a high copper content. Under stressful conditions (e.g. transport, yarding, lactation, malnutrition) the stored copper may be released suddenly from the liver. This causes massive destruction of red blood cells that result in jaundice, red-brown discolouration in the urine (red-water) and, often death.

Ammonia poisoning causes the sudden death (without loss of condition) of sheep grazing pastures that have high protein content such as lush clover or medic. Normally the ammonia produced in the rumen from dietary protein is converted in the liver to urea and excreted in the urine. The capacity of the liver to do this is reduced by heliotrope damage, and as ammonia is toxic in large amounts, death can result.

**Heliotrope toxicity in sheep**

Heliotrope poisoning problems are more common in British breeds and crossbreeds than Merinos. Merinos tend to avoid the plant when other feed is available, whereas British breeds and crossbreeds will eat it more readily and sometimes preferentially.

In general, symptoms are not seen until exposure to heliotrope has occurred over more than one season. The death rate increases with age. In a survey conducted in the Victorian Mallee, about half of the total annual sheep losses were attributed to heliotrope poisoning.

Many affected sheep can live without obvious sickness, or symptoms and death can occur. Severe poisoning episodes are common, characterised either by some sheep losing weight and dying over a period of time, often while they are grazing lush medic or clover pastures, or by the sudden onset of deaths associated with some stressful event such as lambing, mustering or shearing. In the latter case, deaths usually follow one or two days of depression and separation from the mob, with jaundice (yellowing of the fat), but no loss of condition. Photosensitisation (reddening or scabs on the ears, muzzle or other wool-free areas) is common if affected sheep are grazing green pasture.

**Heliotrope toxicity in cattle**

Cattle are more susceptible to the toxic effects of heliotrope than are sheep and deaths can occur within 10 days of commencing to eat heliotrope. Usually however, deaths are spread over several months, with affected cattle showing depression, reduced appetite, loss of condition, diarrhoea, restlessness and persistent aimless walking. As with sheep, cattle can suffer low lethal effects from heliotrope poisoning and the resulting chronic liver damage can be responsible for serious
production losses. Cattle will avoid eating heliotrope when other feed is available, but introduced cattle are more likely to graze it.

**Diagnosis**

Where heliotrope poisoning is suspected, confirmation should be obtained through a veterinary surgeon or animal health adviser who will perform a post-mortem examination and test appropriate samples. Other diseases can cause similar symptoms. For example, pyrrolizidine alkaloids occur in plants other than heliotrope. In the Riverina of New South Wales, *Echium plantagineum* (Paterson’s Curse, or Salvation Jane) is one such plant that is often abundant in pastures. More losses in cattle in these areas are attributed to this plant than to heliotrope because it is more palatable. In sheep, also, the possibility of involvement of plants other than heliotrope should be considered. Similar symptoms can result from other causes of liver damage, such as poisoning by Caltrop (*Tribulus terrestris*) or Lesser Loosestrife (*Lythrum hyssopifolia*), or in other diseases.

**Prevention**

![Liver damage in a cow caused by Heliotrope poisoning](image)

The feeding of a high energy - low protein grain diet (e.g. barley, wheat or oats, but not peas or lupins) and a reduction in stress, will minimise problems with pregnancy toxaemia and ammonia poisoning. Consideration should be given to culling flocks or mobs in which exposure to heliotrope and losses have been high, as the maintenance of a suitable diet for long periods will be difficult and costly.

Minimise the exposure of stock, especially valuable stock, to heliotrope-dominant grazing. Sheep are often used to graze fallows or stubbles as an aid to weed control. The risk associated with this practice should be appreciated.

Use minimum tillage cultivation and stubble retention. Both will reduce the amount of heliotrope that grows.

Grow lucerne or other perennials. Heliotrope seedlings are very susceptible to shading and competition. In the Riverina, dense stands of lucerne (21 to 77 plants per square metre) have been shown to completely control heliotrope.
Combined weed control and livestock management. Seedlings less than 70 mm high can be controlled with non-selective herbicides, but larger plants are quite resistant to herbicides. Also, repeated applications of herbicide are necessary to control later germinations, limiting the usefulness of this method. Sheep of low value and low susceptibility are commonly used to clean up the sprayed weeds.

Where cattle are to be grazed, heliotrope should not be dominant in the pasture.

For further advice on agronomic practices to control heliotrope contact your local agronomist or agricultural advisor.

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