

Zamia poisoning in cattle in the Top End

Cycads or 'zamia palms' in Australia, belong to an ancient family of plants which have existed since the Mesozoic era, predating flowers, grasses and trees. They were the cause of the first documented plant poisonings by European explorers. Vlaming (1697), Cook (1770), La Perouse (1788) and Flinders (1801) all mention consumption of zamia palm as the cause of sickness in men, pigs and cattle¹.

Cycad genera likely to cause toxicity syndromes in livestock are *Cycas*, *Macrozamia* and *Bowenia*. In the Northern Territory, they are found around the Top End and in coastal areas around the Gulf of Carpentaria. The plants have palm-like leaves arranged in a rosette formation around a single trunk, which in most species remains quite low to the ground and is therefore easily accessible to grazing livestock (see Appendix 1).

The leaves, seeds and roots contain at least 2 toxins: an unidentified nervous system toxin that causes irreversible damage to the spinal cord in cattle, and cycasin which, when metabolised to formaldehyde and methylazoxymethanol (MAM), is toxic to the liver in herbivores (plant eaters), pigs, dogs and humans². Early explorers who ate small amounts of cycad nuts suffered from severe vomiting and diarrhoea.

Modern case reports include accidental poisonings of small children and dogs who developed sudden onset liver necrosis (liver cell death) with devastating consequences³.

Livestock may graze cycads when other feed is scarce or if new shoots and leaves are within easy reach. Seeds and young fronds appear to be quite palatable, but are most likely to be consumed during very dry conditions or when regrowth appears after a bushfire. Animals imported from grazing land devoid of cycads appear to be particularly prone to consumption and poisoning, compared with locally bred animals.

In cattle, chronic exposure leads to progressive and irreversible paresis or paralysis, which producers may refer to as 'wobbles', zamia staggers or (mistakenly), 'rickets'⁴. Ataxia and paralysis result from degeneration of nerves in the mid-cervical (neck) and lumbar (lower back) spinal cord, both of which should be included as sampling sites for laboratory diagnosis. Degeneration of the spinal cord means that the nerve cells carrying messages up and down the spine are no longer able to do so.

Clinical signs may develop as soon as 14 days after eating the plants, or may be slowly progressive over a number of years, and initially include:

- goose-stepping gait in the hind limbs
- knuckling of the hind fetlocks
- wasting of the hindquarters.

Differential diagnoses to consider in cases of chronic nervous system disease in cattle include:

- bovine spongiform encephalopathy (mad cow disease)
- rabies
- tetanus
- encephalomyelitis (infection/inflammation of the brain)
- sarcostemma poisoning
- space-occupying lesion of the central nervous system – abscess, cyst, cancer

- lead poisoning
- botulism.

Affected cattle do not improve, because the changes to the central nervous system are irreversible. Cattle may die from misadventure (falling into ditches, gullies and watercourses) or may perish when they become too weak to access water. Despite the meat being unaffected, animals may be unsaleable if they are too unstable to be transported.

There have been a number of confirmed cases of zamia poisoning on properties in the Katherine region. Some animals are native-born, while others have been purchased from elsewhere in the Territory or from Queensland, with clinical signs developing months after purchase. In each case, cattle have presented with progression of signs of knuckling at the fetlock, falling/staggering and plaiting of the hind limbs, increasing debilitation, weight loss, inability to rise and eventually, either death or humane destruction has resulted.

Control of cycads may be problematic for livestock producers. Cycads are protected under conservation laws and cannot be destroyed. One solution if production losses are significant is to fence off zamia country and limit access to it, unless grazing is plentiful and cycads are not in an active growth phase.

Diagnosis of zamia staggers is presumptive in the field (based on clinical signs and access to plants), but definitive confirmation is made on post-mortem findings in the laboratory. Animals with suspected zamia staggers are suitable for TSE (mad cow) exclusion testing, which attracts a producer subsidy under the [National TSEFAP program](#). Contact your regional livestock biosecurity or veterinary officer for more information.

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Appendix 1: Common cycad species of the Territory

Seeds and fronds

Cycas armstrongii



Photos:
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Cycas angulata



Cycas calcicola



References:

1. Hall, WTK 1964 – cited in Cycad (zamia) poisoning in Australia Aust Vet Journal Vol.64 No.5 May 1987: 149-151
2. Australia's Poisonous Plants, Fungi and Cyanobacteria – A guide to species of medical and veterinary importance. McKenzie, R. CSIRO Publishing 2012 p.122-138
3. Ferguson, D et al: Survival and Prognostic Indicators for Cycad Intoxication in Dogs
4. Whiting MG. Toxicity of cycads. Economic Botany 1963;17: 270-302.