Acorn poisoning as a potential threat to animals

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IECTO 2024 Conference
The 1st International Electronic Conference on Toxics
20–22 March 2024 | Online

Figure 1: Oak tree and fruit.

Introduction

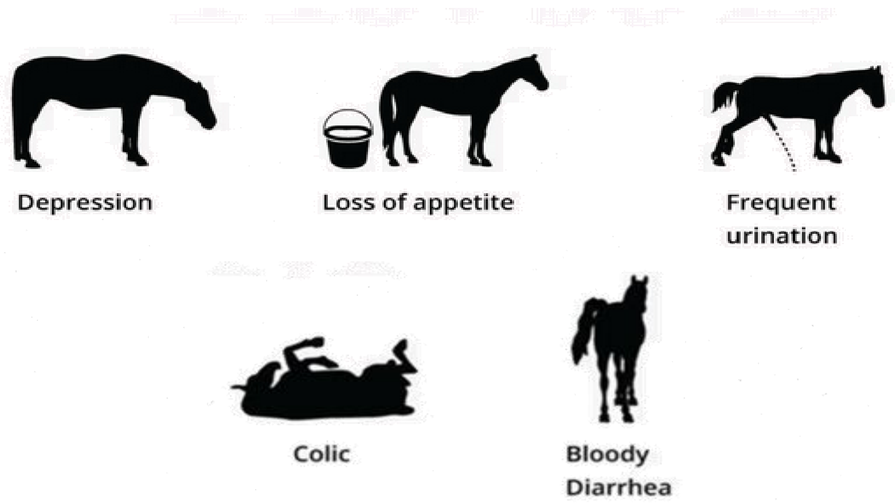
The acorn is the nut of oak trees (genera Quercus and Lithocarpus) that can be found in the Northern Hemisphere. Oak (Quercus spp.) grows both in forests and on the edge of meadows (Figure 1). They are a valuable source of food for many animals (birds, rats, squirrels, pigs), but can pose health risks when consumed in large quantities.

This nut contains gallotannin. When ingested, gallotannin is broken down into gallic acid and tannic acid. Tannic acid is toxic and can cause ulcers in the mouth, esophagus, and intestines, and damage to the liver and kidneys. The precise mechanism of tannin compounds is still poorly understood, but it is speculated that they are able to plug the loop of Henle by entering the cell and forming a precipitate by combining with the cell membrane or nutrients, or that the simple irritant effect of tannins causes lesions in the organs where they accumulate mos Animals that consume acorns as part of their diets (wild boars, deer, bears, birds and squirrels) have some defense mechanisms against this toxin such as waiting to consume them until enough groundwater has percolated through the acorns to leach the tannins or buffering the acorns with other foods. Some animals metabolize tannins better than others. Acorns can be particularly toxic to cattle, horses and dogs, and fatal to all species when consumed in large quantities due to kidney failure.

Although the oak is a tree commonly found in grasslands, full case report descriptions, with supporting further laboratory analysis, are rare in the literature. This work aims to present an overview of this toxin in animals.

Clinical signs

Animals with acorn poisoning may begin showing symptoms within hours or even several days after eating acorns. Symptoms include vomiting, diarrhoea, cramping, abdominal tenderness, depression, rapid weight loss, loss of appetite, tiredness, dehydration, tenesmus, a smell of ammonia on the breath, serous ocular or nasal discharge, polydipsia, polyuria, hematuria, icterus, and constipation followed by mucoid to hemorrhagic diarrhea. The heart rate may be within normal limits (tachycardia and bradycardia can be present) hyperventilation.



Diagnose and treatment

Diagnosis is based on clinical findings, necropsy, history, and histopathologic examination of the kidneys. Renal insufficiency can be evident 4–6 days after exposure and may be characterized by increased BUN and creatinine concentrations, proteinuria, glucosuria, hyperbilirubinuria, hyperphosphatemia, hypocalcemia, and urine with a low specific gravity. At *postmortem* is possible to observe *p*ale, swollen kidneys characterized by coagulative necrosis of the proximal convoluted tubular cells, perirenal edema, subcutaneous edema, ascites, subserosal petechial or ecchymotic hemorrhage of intestinal mucosa, ulceration of the esophagus and rumen, and hydrothorax (Figure 2).

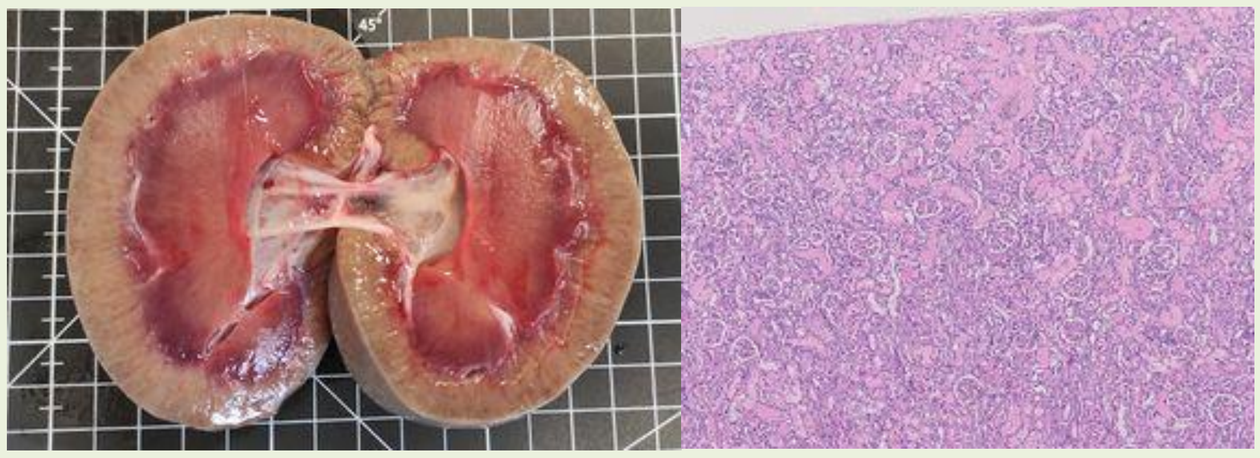


Figure 1: Kidney tubular necrosis (macro and micro image).

There is no specific treatment for acorn poisoning. Feeding 1kg/head/day of calcium hydroxide (hydrated lime) can significantly reduce the risk of poisoning. However, anticipation of outbreaks, fencing off oak trees and removal from pasture are still the best option

The prognosis of this intoxication is poor, with few (15–25%) affected animals recovering.

Discussion and conclusions

Acorn poisoning in animals can have significant impacts on both individual animals and entire populations. It can lead to reduced productivity in livestock, including decreased weight gain, milk production, and reproductive success leading to economic loses. In wildlife populations, acorn poisoning can affect species dynamics and ecosystem health, particularly in areas where acorns are a primary food source. Due to climate change, the weather has become increasingly dry throughout the year and forest fires are common, meaning that during autumn often the only food available in some regions is acorns, leading to a silent killing of animals due to lack of resources. It is important that farmers and veterinarians are aware so that they can offer faster and more effective treatment. Management strategies such as fencing off areas with high acorn densities or providing alternative food sources can help mitigate the impact of acorn poisoning on animals.

References

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