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Popular Article

Plants Containing Oxalates

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Introduction

- Oxalates poisoning is of great concern in livestock and human beings all over the world.
- Oxalic acid is an organic dicarboxylic acid that readily forms insoluble salts with cations like calcium and magnesium. However, its sodium, potassium or ammonium salts are highly soluble and can induce toxicity in animals.

Routes of infection and persistence of the pathogen on farms

- Oxalate poisoning in livestock primarily results from ingestion of large quantities of oxalate containing plants.
- Oxalate containing plants are palatable and frequently form bulk of ruminant's ration.
- For causing toxicity, the plants should contain more than 10% oxalic acid on dry weight basis.
- The form in which oxalate is present in the plant may be of importance in terms of toxicity, that is whether it exists mainly as acid oxalate (e.g. in Oxalis sp., Rumex sp.) or oxalate ion (e.g. in certain Chenopodiacae)

Mechanism of toxicity

- Normally, after ingestion of the plants, calcium present in the stomach may react with the oxalates to form insoluble salts which cannot be absorbed and eliminated in the faeces.

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- This process is more effective in ruminants than simple stomach animals and consequently, ruminants can consume large amounts of oxalate containing plants without any apparent signs of toxicity.
- However, when very large quantities are ingested that exceeds the capacity of digestive tract to convert the soluble oxalates into calcium oxalate, the soluble oxalates absorbed through intestinal mucosa and are available to interact with blood calcium causing acute hypocalcemia.
- Further, calcium oxalate crystals may get accumulated in the kidncy tubules causing severe renal damage.
- Calcium oxalate may also crystallize in the brain.

Clinical signs

- Dullness, lowering of the head, loss of appetite and remaining isolated from the herd are initial evidences of oxalate poisoning seen after 4 hours of feeding oxalates-rich plants.
- These observations are followed by excessive salivation with frothing, progressive incoordination and coma with deep irregular respiration.
- Convulsive episodes may also be noted.

Post-mortem lesions

- Lungs may be filled with dark-red or purplish colored blood as most of the deaths in oxalate poisoning are associated with asphyxia.
- Petechiae hemorrhages and cyanosis may be seen at various locations.
- Crystalline masses may be observed in renal tubules, with a concentration in the cortices.
- Microscopic examination of kidneys may reveal presence of calcium oxalate crystals, ruptured tubules and degenerative

Diagnosis:

- History of feeding/grazing on oxalates-rich plants.
- Clinical signs.
- Post-mortem lesions.

Treatment:

- Discontinue feeding of oxalate containing plants.
- IV or SC 25% Calcium Boro gluconate @ 50-100 ml (sheep), 300-500 ml (cattle).

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- Administration of calcium ions to promote the elimination of oxalates as calcium oxalate. Dicalcium phosphate is very effective in aiding the elimination of oxalates (as calcium oxalate) from the gastrointestinal tract.

Prevention:

As the oxalate ions react readily with Ca 2+, feeds containing high levels of calcium (calcium phosphate or dicalcium phosphate) may be fed to the animals so that it interacts with oxalic acid to form insoluble calcium oxalate and eliminated through faeces.

Spinach

Amranthus

Beet rot

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