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Cyanide poisoning in livestock

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Introduction

Cyanide poisoning, also called prussic acid or hydrocyanic acid (HCN) poisoning, it is an important and often fatal poisonous condition in animals. It occurs when an animal eats plants that contain cyanogenic glycosides, such as sorghum, Sudan grass, and Johnson grass.

Causes and Sources of Cyanide Poisoning

Cyanide poisoning in animals may occur when livestock consume cyanogenic plants, from which they are released during digestion. Hydrogen cyanide (HCN) or prussic acid is a toxic substance that can be particularly dangerous for ruminants like cows, sheep, and goats. It can be quickly produced by microorganisms inhabiting the rumen from the plant's cyanogenic compounds.

Sorghum, Sudan grass, sorghum-Sudan hybrids, and Johnson grass are the most common plants reported to cause poisoning. Wild cherries and other native plants may also be a source of HCN. Moreover, the levels of toxin can increase due to drought, frost, wilting, trampling, cutting, or mowing. Cyanide levels can also rise in young plants and new growth after a period of stress. For example, when hungry animals are turned out on a stand of forage, they may eat it ravenously. As a result, a significant amount of HCN may be ingested, causing animal poisoning.

Major cyanogenic plants responsible for livestock poisoning


Sudan grass


Johnson grass


Sorghum bicolor

When does sorghum become Toxic?

- **Young/immature plants** – young sorghum plants contain higher levels of prussic acid.
- **After drought** – draught stressed plants can accumulate higher levels of cyanogenic glycosides, increase the risk of poisoning in grazing animals.
- **After frost** – frost-damaged plants may release HCN more readily due to damage to plant tissues.
- **Rapid re-growth** – New shoots developing after cutting, grazing or stress may contain high concentrations of prussic acid.

What does cyanide do to the animal?

Cyanide is a fast-acting poison that inhibits the cells' ability to absorb oxygen. Once released from the cyanogenic compounds in the digestive tract, it is quickly absorbed into the bloodstream and reaches all body tissues.

Cyanide mostly inhibits the cytochrome c oxidase, which is an enzyme needed during the cellular respiration. Inhibited cells are unable to use oxygen even when there is an adequate supply. This leads to severe hypoxia of the cells, most severely affecting the organs that are most dependent on oxygen, such as the brain and heart.

Clinical Signs of Cyanide Poisoning in Livestock

Cyanide poisoning is a quick-acting emergency in livestock. Clinical signs can occur within minutes to a few hours after animals ingest toxic plants. Accelerated and laboured breathing, Salivation, Restlessness, excitement, or anxiety, Trembling, muscle twitching, and weakness, Staggering, ataxia, and incoordination, Dilated pupils, Increased urination or defecation, Seizures, Collapse and recumbency, Coma and Sudden death.

Bright red mucous membranes and blood are also typical post-mortem findings in animals that die from cyanide poisoning. The reason for this is that oxygen is unavailable to the tissues, so it cannot be utilized. In severe poisoning, animals can die suddenly and show only a few of these symptoms.

Treatment

Cyanide poisoning is a veterinary emergency, as affected animals can deteriorate and die quickly. Treatment should be initiated as soon as possible after suspicion of poisoning and should be administered by a veterinarian.

1. Animals should be removed from the suspected source of toxic forage immediately and prevented from further consuming it.
2. Supportive care, such as ensuring adequate breathing and circulation and reducing stress, should also be provided.

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3. The veterinarian may administer an antidote specific to cyanide poisoning. Commonly used antidotal therapies include sodium nitrite followed by sodium thiosulfate. Hydroxycobalamin is another antidote that may be used in some cases. Sodium thiosulfate aids in the conversion of cyanide to a less toxic form that can be eliminated from the body.

Affected animals requiring such intervention should receive close monitoring and supportive treatment until they recover from the poisoning.

Prevention

Cyanide poisoning can generally be prevented by proper management of pastures and feed.

The key preventive measures are as follows:

1. Identify cyanogenic plants such as sorghum, Sudan grass, sorghum – Sudan hybrids, and Johnson grass,
2. Avoid grazing stressed plants such as those affected by drought, frost, wilting, or other weather changes,
3. Do not allow animals that are hungry to graze suddenly on a potentially toxic plant, but first give them enough safe feed.
4. Allow plants to regrow rapidly after cutting, drought, or other stresses to grazing,
5. Test suspicious feed for prussic acid (HCN) when there is a justified risk of poisoning,
6. Use properly processed hay or silage if possible since the process of producing silage reduces the risk of poisoning,

Remove toxins from animals' pastures and ensure that they do not have access to them, and regularly monitor pastures for toxins, especially during droughts, frosts, and rapid regrowth.

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