



College of Veterinary Medicine
Department of Internal Medicine & Preventive



Sweet Clover Poisoning

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Lecture 6



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ETIOLOGY

Coumarol (coumarin glycoside) and melilotin, normal constituents in some plants, are converted to dicoumarol (dicoumarin or dihydroxycoumarin) by the fungi *Aspergillus* spp and other unspecified molds, which grow in hay or ensilage



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plants:

- sweet vernal grass
- lespedeza
- Melilotus alba: sweet or Bokhara clover is the most common plant associated with poisoning.
- The toxic level of dicoumarol in moldy sweet clover feed samples is approximately 20 mg/kg of feed.



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Occurrence

- Sweet clover poisoning is recorded most commonly in North America, where sweet clover is grown as a food crop.
- In affected herds the morbidity rate is about 12%, with a case-fatality rate of 65%.



- The disease occurs most often during the winter months when stored hay or ensilage is fed to cattle.

Risk Factors

Animal Risk Factors

- The disease can occur in all species but is most common in cattle, less so in sheep, and very rare in horses.



- Clinical signs may appear without apparent precipitating cause, but trauma, surgery (castration, dehorning), and warble fly migration are often followed by deaths from hemorrhage.
- In most outbreaks heavy mortalities occur without warning.



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Plant Risk Factors

- Not all moldy sweet clover hay or silage contains dicoumarol, and the degree of spoilage is no indication of the toxicity of the hay sample.
- Grazing the crop is not dangerous, but making it into hay or ensilage without the development of mold is difficult because of the succulent nature of the plant.



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- Dicoumarol concentrations in sweet clover hay bales, hay stacks, or silage vary widely, being highest in small bales, round bales contain more than hay stacks, and the levels are low in silage.
- The levels of dicoumarol are highest in the outer parts of hay bales, presumably because they are exposed to moisture.
- note: dicoumarol-producing fungi require oxygen



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Pathogenesis

- vitamin K is essential for final carboxylation and activation of clotting factors II (prothrombin), VII (proconvertin), IX (Christmas factor), and X (Stuart factor).



- Dicoumarol competitively inhibits vitamin K 2,3-epoxide reeducates, and results in impaired fibrin stabilization of platelet plugs, and affected animals are subjected to internal and external hemorrhage.



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Clinical findings

- Extensive hemorrhages into subcutaneous tissues, intermuscular planes, and under serous surfaces. The hemorrhages may be visible and palpable as hematomas.
- They may be stiffness, lameness, disinclination to move, and even recumbency. One limb may be severely swollen.



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- the affected animal continues to eat well, but the mucosa are pale and often show petechiation or ecchymosis.
- Accidental and surgical wounds are associated with severe bleeding.
- Newborn calves may show extensive swelling of the head and neck and become weak from internal or external hemorrhages within a few hours of birth.



- When the loss of whole blood is severe, signs of hemorrhagic anemia appear. The animal is tachycardic and weak, the mucosae are pale, and the absolute intensity of the heart sounds is increased markedly.
- A short course of 24 to 48 hours and a high case fatality rate are usual.



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Diagnosis:

Clinical pathology

- Severe anemia with markedly increased clotting times are characteristics of the intoxication.
- Laboratory values for packed cell volume (PCV), erythrocyte count, and hemoglobin are decreased.
- values for activated clotting time (ACT), activated partial thromboplastin time (aPTT), prothrombin time (PT), partial thromboplastin time (PTT).



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Necropsy findings

- Subcutaneous hemorrhages and large hematomas occur in areas where normal activity produces mild contusion, such as the flanks, carpal and tarsal joints.
- Hemorrhages of the serosal surface of the rumen and massive retroperitoneal hemorrhage around the kidneys.



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Differential diagnosis

1-African horse sickness
anemia

3-Purpura hemorrhagica

2-Equine infectious

4-Thrombocytopenia



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Treatment

- Feeding of the suspected hay or silage should be stopped immediately, but new cases may continue for up to about 6 days.
- Vitamin K1 (phytonadione) is an effective antidote for sweet clover poisoning at a rate of 1 to 1.5 mg/kg BW IM or SC in cattle, and 0.5 to 2.5 mg/kg BW IM is recommended in horses.
- severe hemorrhage should be given a fresh plasma or whole-blood transfusion and treated for shock.



Control

- Sweet clover forage must be carefully prepared and should not be fed if it is damaged or spoiled during curing.
- Moldy portions of hay or silage should be discarded, and representative samples of suspected feed should be submitted for analysis of dicoumarol content.