

PLANT POISONINGS IN LIVESTOCK

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ABSTRACT

Plant poisonings often affect many animals in a short period of time. Finding of common feed will support a suspicion of poisoning. It is important to establish an accurate diagnosis in order to provide adequate treatment to affected animals, carefully and accurately assess the potential for the transfer of toxins into edible products and prevent further exposures. In addition, producers and veterinarians must often handle additional emotion, publicity, and medico-legal issues.

In California, the most common plants of serious concern to livestock are oleander, common groundsel, pigweed and bristlegrass. In addition, alfalfa-induced photosensitization has resulted in a number of serious outbreaks in horses. The severity of plant poisoning is illustrated by specific cases.

Key Words: common groundsel, bristlegrass, oleander, nitrate, photosensitization

INTRODUCTION

The possibility for toxic plants to end up in hay and forage represents a serious risk to livestock and other animals. There are several factors which contribute to an animal poisoning. Foremost, there is the requirement that a sensitive species of animal ingest or otherwise be exposed to a toxic plant at an appropriate time. While there are many indications for plant poisonings, the most obvious cases involve sudden onset of disease in a group of animals. A diagnosis of poisoning is often supported when common feed or environmental conditions are found. A toxicosis is also suggested when the animal dies suddenly, because many plant toxins result in an acute poisoning.

Correctly and rapidly diagnosing a plant poisoning is often extremely difficult. In many cases, initial clinical signs are non-specific (such as diarrhea) and post-mortem lesions may be absent. Specialized veterinary toxicology laboratories may provide testing for plant toxins and should be consulted. The best way to support a diagnosis of a plant poisoning is to confirm the presence of a toxic plant in the animal's environment, to confirm that the plant has been ingested (by noting that the candidate plants have been chewed and/or finding plant fragments in gastrointestinal tract samples) and to correlate clinical findings, when possible, with those known to be associated with the suspect plant. If diagnostic tests are available, the diagnosis can be confirmed. This is especially important in insurance or legal investigations.

Poisonous weeds that have been found in alfalfa include oleander, nitrate accumulator plants, bristlegrass, bristly oxtongue and pyrrolizidine alkaloid containing plants. Undesirable effects

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may result from ingestion of large amounts but may also be associated with the ingestion of minute amounts of highly toxic plants present in alfalfa. Awareness of poisonous plants growing in a certain geographical region and their associated clinical signs are instrumental in making a diagnosis and initiate treatment. Most importantly, recognition of poisonous plants in hay or forage may help prevent plant poisonings in animals.

COMMON GROUNDSEL

Common groundsel (*Senecio vulgaris*) is a pyrrolizidine alkaloid (PA) containing plant that is commonly found in spring cut alfalfa hay. Poisoning with common groundsel is typically a chronic disease and animals may not show clinical signs for 2-8 months after the first ingestion. Affected animals lose condition, and develop icterus because of the toxic effects to the liver (Cheeke, 1998). Cattle and horses are most susceptible to the toxic effects while sheep, goats and small herbivores (e.g. rabbits, guinea pigs, hamsters) are resistant (Cheeke, 1994). Cattle may also develop photosensitization. In horses, neurological signs are commonly observed (Schmitz, 1998). In the western US, other *Senecio* spp. (groundsel and ragworts) and fiddlenecks (*Amsinckia* ssp.) also contain PAs and can result in toxicosis. New plantings of alfalfa and alfalfa weakened by heavy weevil infestations are more susceptible to competition by common groundsel. Identification of PA-containing weeds in alfalfa and detection of PAs in forage are important to prevent poisonings. While there is some degradation of PAs in silage, the PA content of hay remains constant over many months. Silage contaminated with more than 5% *Senecio* spp. is considered unsafe for cattle or horse feeding (Candrian et al., 1984).

NITRATE POISONING

The most common nitrate accumulating weeds identified in alfalfa hay are pigweed (*Amaranthus retroflexus*) and lamb's quarters (*Chenopodium* spp.). Among crop plants, especially oat hay and sorghum have been incriminated with nitrate toxicosis, but alfalfa itself may contain potentially toxic nitrate concentrations. Nitrate accumulates in the vegetative tissue, particularly in stems with less in the leaves (Bedwell et al., 1995). Heavy fertilization of pastures, herbicide treatment, drought, cloudy weather, and decreased temperature may increase the nitrate concentrations in plants. Nitrate poisoning is an acute disease in ruminants, especially cattle. Clinical signs of acute nitrate poisoning include depression, respiratory distress, tremors, ataxia, rapid heartbeat, and terminal convulsions. Death may occur within 6-24 hours of ingestion. Diagnosis is based on appropriate clinical signs and laboratory analysis of nitrate and nitrite in serum, blood, ocular fluid, rumen contents, and forage. Forage nitrate levels of 0.3% and above are potentially dangerous, with acute poisoning likely to occur if the nitrate level exceeds 1%. Forage management techniques can affect the concentration of nitrate and can reduce the risk. Careful use of nitrogen fertilizers, harvest under appropriate conditions, supplementation of ration with corn, ensiling, and testing hay and forage for nitrate content are approaches to minimize the risk of nitrate poisoning in animals.

OLEANDER

Oleander (*Nerium oleander*) poisoning is a common poisonous plant problem encountered in California. The California Animal Health and Food Safety (CAHFS) Laboratory at the University of California, Davis, diagnosed oleander poisoning in 304 separate incidents involving one or more animals from a time period ranging from 09/1998-09/2007. This number likely represents a very small fraction of oleander poisonings that occur throughout California. In

livestock, oleander poisoning often results from accidental ingestion of plant clippings, plant material baled with hay, or chopped into silage. Modern agricultural practices, like crimping of hay can create a greater risk for oleander contamination from leaves blowing into the fields before harvest. Most commonly, horses, cattle, goats, llamas, and alpacas are affected, but oleander poisoning has also been reported in sheep, cats, dogs, birds and humans. All parts of oleander are considered toxic, whether fresh or dried. Leaves and flowers have the highest concentrations of toxic cardenolides and it is estimated that 5 to 10 medium-sized leaves can be lethal to a horse, while as few as 8 leaves can cause death in a cow (Galey et al., 1998). Clinical signs of oleander poisoning include diarrhea, excess salivation, depression, and anorexia. As the disease progresses, the animals develop a variety of cardiac signs, including bradycardia and arrhythmias. At this stage of the disease, the animals may also show tremors and difficulty breathing. However, often the disease progresses so rapidly that the animal is found dead and clinical signs are not observed. Diagnosis of oleander poisoning has improved significantly since the development of several specific analytical methods (Tor et al., 2005). Suspect contaminated plant material can also be analyzed for oleandrin to prevent fatal oleander poisoning in livestock.

BRISTLEGRASS

Plants with sharp and barbed bristles or spines have been associated with disease in animals. The resulting mechanical injury is a particularly serious problem in horses. Lesions are often seen in the mouth and they will cause pain and result in reluctance to eat. Deep ulcerations of the tongue, gums, and cheeks, which may lead to abscesses, may also be noticed. Exposure of horses to alfalfa hay contaminated with *Setaria* spp. has resulted in mechanical irritation. The alfalfa hay contained large amounts of two different species of bristlegrass: *Setaria viridis* (green foxtail) and *Setaria glauca* (yellow foxtail, yellow bristlegrass, bristly foxtail). Both species have sharp and barbed bristles, particularly *S. glauca*. Problems usually occur when alfalfa is cut late and a substantial number of panicles are present. Although mainly a problem in horses, the mechanical injury has also been reported in cattle (Fava et al., 2000). If alfalfa hay is contaminated with bristlegrass, it should not be fed to livestock animals. It may be necessary to have a veterinarian evaluate all animals and initiate treatment, if necessary.

PHOTOSENSITIZATION

Photosensitization associated with consumption of alfalfa or other Medicago species appears to occur sporadically in California. The photoactive substance is unknown and it is not known why or how it is formed. Thus, alfalfa cannot be screened for toxins potentially resulting in photosensitization. Affected animals have swelling and reddening of skin and the affected skin may weep serum and slough or peel. Skin damage is typically limited to the unpigmented, white areas. There are several different types of photosensitization related to plant exposures, primary and secondary photosensitization. The most recent cases of photosensitization in horses in CA were diagnosed as primary photosensitization, i.e. a result of a photosensitizing agent in the plant material. Alfalfa hay was inspected for contamination with potentially toxic weeds and analyzed for a variety of toxins, but none were found. At this time, it is assumed that alfalfa hay can contain a phototoxic compound that leads to photosensitization. The phototoxic compound is yet to be determined and the toxic mechanism is still unknown. Due to the sporadic nature of photosensitization, other factors may also play a significant role.

SUMMARY

Toxic plants can be devastating if they are grazed upon or unintentionally incorporated into hay or silage. The recognition of poisonous plants in hay or forage is essential to the prevention of plant poisonings in animals. Veterinarians and diagnosticians, along with producers and farm managers play important roles as guardians, and all can contribute important information to diagnoses of plant poisonings. Once all the information is available, all evidence is collected, and proper sampling of specimens has occurred, a summary of findings can be provided that will be instrumental in preventing reoccurrences.

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