

Toxic Ingestions by Companion 'Farm' Animals

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INTRODUCTION

Toxic ingestion/poisoning can occur as an acute poisoning or from chronic exposure. Small ruminants can be targets for poisoning through accidental exposure, by mischievously exposing themselves (goats!) or by chronic environmental exposure. Although toxicological cases do not make a large portion of a caseload, when they do occur, there can be emotional and financial losses as well as the potential for legal issues and possibly even food residue issues. Many toxicants have no specific or effective antidote and therefore the approach to each case will center on decontamination and supportive therapy. In this talk, we will discuss some of the common toxicants and how to deal with them for small ruminants (primarily goats) and to a much lesser extent, pot bellied pigs.

DEFINITIONS

Poison and/or Toxin. Any substance (liquid, solid or gas) that can impair function, cause structural damage or otherwise injure the body.

Toxicity. The amount of toxin which under specific conditions will produce detrimental biological effects. It is generally expressed on a milligram of toxin per kilogram of body weight.

Acute Toxicity. The effect of a single dose (or multiple) of a toxin observed during a 24 hour period

Chronic Toxicity. The effects produced by prolonged exposure to a toxin with the duration of exposure generally being for 3 months or more.

Antidote. Something used to counteract a poison. They can be mechanical which prevents or decreases absorption of the toxin or they can be specific (physiological) which produces opposite physiological effects of the toxin or binds the toxin

APPROACHING THE PROBLEM

Most exposures for companion 'large' animals occur through the oral route or via dermal absorption. When suspecting a toxic ingestion or absorption, be sure to gain a very thorough history and clearly document findings. Taking digital images are helpful in documenting findings. In the history, ask about vaccination status, travel, feed changes, plant exposure, environmental changes and/or work being done on/near the property.

The following scenarios should lead the individual to suspect poisonings or a toxic ingestion:

1. A sudden or an unexplained onset of disease or death of multiple animals.
2. Affected animals share a feed and/or water source.
3. The affected animals live in the same environment or they have all recently been moved to a new environment.
4. There has been a recent feed change.

TREATMENT STRATEGIES

Objectives to consider when approaching a toxic problem include: 1) minimizing exposure to other animals (if applicable); 2) decontaminating the exposed animal(s); 3) assessing and addressing the animal's clinical status; and 4) giving specific antidotes if available or possible.

1. Minimize exposure: This can be done by physically removing the toxin if known (such as pesticide or feed) or if the toxin is unknown, move the animals to a different place.
2. Decontaminate:

- a. For dermal toxins: Wash the animal with detergent and rinse well taking care not to contaminate yourself. You may need to clip the hair or wool if it is very long/thick or heavy.
- b. For oral intoxication: In **goats/sheep** the toxin may still be in the rumen for up to 4 hours which gives you time to attempt to lavage the rumen with fluid via NG tube (usually not very successful) or perform a rumenotomy to physically empty the rumen. If the time frame has been longer or those procedures are not an option, then administering activated charcoal (1 g/kg) will help decrease absorption of most toxins. Simultaneously, you can administer a laxative (cathartic) such as mineral oil or magnesium sulfate to speed up the transit and excretion time. Do not administer medications meant to induce vomiting. Address acid/base status if it is known. **Pot bellied pigs** have a digestive tract similar to dogs and cats. They can also be given activated charcoal and cathartics. If they are willing to eat, put one or both in low sodium soup broth or flavored water and allow them to drink it. It is difficult to pass an NG tube in an awake pig and drenching them may result in aspiration pneumonia.

Assess/address clinical status: Give supportive care through IV fluids to maintain hydration and perfusion throughout the body.

Specific antidotes: There are relatively few specific antidotes available in veterinary medicine and those that are, may be either difficult to acquire or may be extremely costly. Most therapies would come with food residue concerns. Even though we are treating a pet, meat/milk withdrawals still need to be recorded and discussed as sheep, goats and pigs are still considered 'food animals'. Contact FARAD with specific questions about withdrawal periods. www.farad.org

COMMON TOXICANTS (SMALL RUMINANTS)

The following list is not an all-inclusive list and it is relatively specific to California (West Coast).

Commonly ingested toxins that are reported in goats/sheep include the following: copper, organophosphate/carbamate insecticides, ionophores, nitrates/nitrites, selenium, Yew, and Oleander.

We will discuss each one briefly

Copper Toxicity

Sheep are very sensitive to copper levels while goats tolerate a higher level of copper. The common way that copper toxicity occurs is through mis-mixing at the feed mill, feeding cattle or horse feeds (which have higher copper levels) to sheep and/or from copper water pipes. Typically, the exposure is a prolonged one and the copper levels accumulates in the liver. A stressful or noxious event (such as shipping, temperature change, parturition or shearing) typically initiates a hemolytic crisis which results in inappetence, vomiting, diarrhea, weakness, recumbency and even sudden deaths. Treatments include chelation therapy (EDTA), supportive and low stress care and possibly blood transfusions.

Organophosphate/Carbamate Insecticides

These are the ingredients in many pesticides and herbicides and therefore are frequently found on farms. Toxic overdoses can occur via topical or oral routes. The clinical signs include frothing at the mouth, restlessness, tremors, rapid breathing, increased urination and defecation, gloat, staggering, teeth grinding and possible death. Specific treatment to counteract signs of toxicity are using 0.6–1 mg/kg of atropine sulfate. One fourth to one third of the total dose should be administered intravenously while the remaining dose should be given subcutaneously. This can be done every 4 to 5 hours as needed but should be slowed down or stopped as soon as possible to avoid serious GI stasis and bloat. 2-pyridine aldoxime methiodide (2-PAM) can also be used at 50–100 mg/kg in organophosphate toxic cases but not with carbamate poisoning.

Ionophores

These compounds are frequently added to milk replacers or feed as a coccidiostat. They are also growth promotants frequently found in cattle feed. Toxic ingestion commonly occurs through feed mixing errors. Sheep are more sensitive to ionophore toxicity than goats. Clinical signs of ionophore toxicity can include depression, anorexia, diarrhea, tachycardia and sudden death. Lesions can often be found on the heart. There are no specific treatments for ionophore toxicity.

Nitrates/Nitrites

Animals are exposed to or consume excess nitrates by eating plants containing high levels of nitrates (nitrate accumulators), drinking water contaminated with run-off from fertilized fields or direct consumption of the fertilizers. Nitrites cause oxidation of ferrous hemoglobin to ferric hemoglobin (methemoglobin) which cannot transport oxygen. Clinical signs are weakness, trembling, dyspnea and cyanosis. Therapy is the administration of 4–15 mg/kg of methylene blue as a 1% solution in distilled water given IV. This reduces the methemoglobin back to hemoglobin. However, methylene blue is readily passed into the milk and can be carcinogenic and therefore would carry a long milk withdrawal.

Selenium

Selenium is found in the soil and plants can accumulate selenium (milkvetch, asters, sage, snakeweed). Additionally, it is common practice in selenium deficient regions of the country to supplement selenium through injections or feed supplements. (Southern California is not selenium deficient) Clinical signs of selenium toxicity include depression, dyspnea, poor hoof and hair quality (chronic exposure). At necropsy, congestion of lungs and myocardial necrosis may be seen in acute cases while cardiac atrophy, hepatic cirrhosis and long bone erosion can be seen with chronic exposure. There are no specific treatments for selenium toxicity. Prevent a possible problem by knowing the area and need for supplementation of selenium and being aware of the plants that the animal is consuming.

Yew (*Taxus spp*)

This plant contains a toxic alkaloid. Clinical signs include bradycardia, hypothermia, depression and weakness. The severity of the disease and clinical signs will vary on the amount of plant ingested but can last for several days. Treatment concentrates on removing the ingesta from the rumen and or preventing absorption of the toxin and supportive care.

Oleander Toxicity (*Nerium oleander*)

This plant contains a cardiac glycoside. Clinical signs include bradycardia and/or arrhythmias, depression and weakness. The severity of the disease and clinical signs will vary on the amount of plant ingested but can last for several days. As few as 8 leaves can be lethal to a cow. Treatment concentrates on removing the ingesta from the rumen and or preventing absorption of the toxin and supporting/maintaining normal blood pressure.

COMMON TOXICANTS (POT BELLIED PIGS)

Toxicants that pot bellied pigs would be exposed to will be similar to what is seen in small animals, particularly dogs. They can gain access to organophosphates/carbamates if they are present. Diagnostics and treatment would be the same as above and for small animals.

Other concerns would include pigs eating fermented (waste) fruit and becoming intoxicated by the alcohol present. If severe enough, the animal would need to be treated for alcohol toxicity or simply be allowed to 'sleep it off'. Similarly, pigs could suffer THC poisoning accidentally or as part of a 'prank' by their human owners. Therapy is supportive.

DIAGNOSTIC TESTING

While there is no magic test for all possible toxins that an animal could have been exposed to, being systematic and thorough in your sampling increases the likelihood that you will obtain the accurate diagnosis. Important facts to keep in mind are that it is always better to have more samples than too few - especially if there could be legal ramifications. Samples should be identified/labeled correctly and stored properly. As a general rule, if the sample is moist it should be frozen, if the sample is dry it should be

stored cool and dry and if you are dealing with tissues, you should save them as both fresh and fixed. Communicate with the diagnostic lab to be sure to collect the appropriate samples. Get samples of everything: serum, whole blood, feces, reflux, milk, urine, ocular fluid, kidney, brain, heart, liver, lung, fat, hair whenever possible. If a toxin is suspected in the feed or water, gather samples of what the animals were currently consuming as well as submitting possible toxic plants for identification. A pathologist or toxicologist will be able to determine which samples to keep and which to discard.

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