

Managing Your Ranch for Poisonous Plants

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As more and more people enter the world of raising alpacas and llamas, many are starting ranches for the first time. Setting up a new ranch can be a difficult task and may seem overwhelming. In conversations and during seminars with new (and some experienced) alpaca and llama owners, I have found that many have expressed concern, and a desire to learn, about poisonous plants in and around their pastures. The following article was written to help alleviate some of that concern and to help alpaca and llama ranch owners to develop a simple program to control what grows in and around their pastures. It is not reasonable to think that we can eradicate all toxic species of plants, however it is possible to take a few simple steps to make sure that the lives of our animals are not in jeopardy and our pastures are safe. I start with a short introduction to poisonous plants, and then present some of the most troubling species that a ranch owner can easily control. I end with a brief summary and a simple management plan that can be used by alpaca and llama owners across the country.

Introduction

We have known that certain plants are toxic to humans and livestock for many thousands of years. However, many of our presently prescribed medications have their basis in plant toxins. In fact, medical (herbal) botany is the precursor to our modern day medical practices. The study of poisonous plants (phytotoxicology) is in itself a daunting task. It is a field that combines three already complex fields (animal physiology, plant identification,

and biochemistry) into one science.

The toxic components that make a plant poisonous can be broken down into different groups of chemical compounds (table 1). Some plants, such as members of the nightshade genus, contain more than one toxic compound. Different parts of a plant may be more toxic than others due to different types and concentrations of toxic compounds; for example, leaves of cherries are more toxic than the stem and fruit. Some plants, such as foxglove, lose their toxicity after being cut and left to dry. Others, such as black cherry, may actually become more toxic during certain stages of drying as the toxin (a form of cyanide in the cherry) becomes more concentrated when the water in the plant evaporates from the leaf tissue.

Why do plants contain toxins? In most plants the toxins act as a defense against predation. The fruit of some plants, such as tomatoes, are highly toxic when unripe, but lose their toxicity when mature. Fortunately for the tomato plant, the lack of toxicity in ripe tomatoes allows it to be consumed and consequently spread. As to the toxic unripe tomato, many people who raise animals know that livestock coexisted for thousands of years with a large number of plants, many which are toxic during some part of their life cycle.

How do livestock know how to avoid a poisonous plant? The principal involved is simple: the toxic compounds in plants, when active, often give off odors or other signals to the animals warning them to keep away. The animals in turn, will avoid that plant altogether or during that portion of its life stage. A problem with toxicity will arise, however, when 1) the livestock is starved (poor pasture, for example) and will graze on toxic species through starvation, 2) the animal is too young to recognize the plant's warning system (crias!), or 3) the plant is one of the few that does not seem to have a warning system (such as black cherry) that is easily recognized by the animal.

The first two categories of poisoning can be easily controlled. The first category by ALWAYS providing appropriate pasture for your animals! Poor quality grasses or overgrazed pastures can lead to livestock grazing on, and potential toxicity by, poisonous

plants. We need to remember that plants are in competition with each other. The second category can be kept under control by keeping a close eye on your crias. Make sure for the first week or two that they are in a pasture, or controlled area that you know is safe and poisonous-plant free. After that they will usually follow the lead of their mother and will quickly learn what can and cannot be grazed. The third category is more troubling. Although the number of plants in this category is few, some of them are the most toxic ones known to humankind. It is well worth the while of a rancher to learn about the plants in their area that fall into this category. I give several sources (books, local universities) at the end of this article that the reader may turn to for help. As well, I will discuss some of the major ones in the following section.

Poisonous Plants of Concern

The following section presents some of the more common poisonous plant of the continental US along with some suggested management practices that the ranch owner may use to minimize problems associated with them. The plants chosen include both native and planted species that have been proven to be problematic to livestock. I have chosen to list them alphabetically by common name for no better reason than to present an easy method for the reader to find a plant of particular interest. This list is by no means exhaustive as it must be limited due to space and time limitations. For a more complete list of poisonous plants please refer to the references listed at the end of the article.



Cherry (all members of the genus *Prunus*)

The cherry tree is a member of the rose family and is found throughout the US. Cherry trees and their closely related

allies, apples, apricots, and peaches, each contain, in various amounts, a toxic chemical that is classified as a cyanoglycoside (hydrocyanic acid). Hydrocyanic acid is a long chain hydrocarbon (a sugar) that, when grazed by livestock, produces a very undesirable byproduct: cyanide. Black cherry is a common colonizing plant species on the east coast and very common in and along fence lines. I have found that livestock readily grazes it even when good pasture is available. Kingsbury (1964) calls the black cherry "...one of the most dangerous plants to livestock in the East". Small amounts of cyanide can be rendered harmless to humans through our own physiological processes. Because of the volatility of cyanide, our bodies can quickly turn it into a gas and exude it through several different tissues, including our skin (large amounts of cyanide are, as we all know, another story!). Unfortunately, this doesn't appear to be the case for ruminants (and possibly camelids) and, in fact, even in small amounts they seem to be more susceptible to its toxicity. Kingsbury (1964) noted that as little as 1/4lb. of ingested leaves have proven lethal to a 100lb. animal.

Signs of Poisoning: Cyanide poisoning will cause stimulation of respiration after ingestion, quickly followed by shortness of breath and overall difficulty breathing, a strong bitter odor to the breath, gasping, staggering, prostration, and, eventually, coma and possibly death (Kingsbury 1964).

Management: I recommend removing all cherry trees from fields and along fencerows where they may be accessible to animals (actually, I suggest that any member of the Rose family be removed from a pasture). It is important to note that Prunus has been shown to be most toxic when about 25% of water has been lost from the leaves or when young suckers grow from the stump of trees that have been previously cut down. Therefore, old clippings and trimmings can be extremely dangerous and should be kept from the reach of your animals. When removing a tree, make sure to either pull the remaining roots or treat them with a glyphosate herbicide (ask your agricultural extension agent which one is recommended for your area, note that it will probably require several treatments). If herbicides are used, be sure to follow the directions carefully

and keep your animals away from the treated areas for the recommended time listed on the label. Alternately, you could simply cut new "sucker" shoots back bi-weekly; the roots will eventually die, but it may take a year or two.



Nightshade Family (belladonna, tomatoes, potatoes, eggplants, and others)

Few people realize that some of our most edible plants, such as the tomato, may also be one of the most deadly to livestock. Tomatoes, potatoes, and eggplants, all commonly planted in our gardens, are members of the Nightshade family (Solanaceae) and are closely related to the Belladonna (*Atropa belladonna*), Jimsonweed (all *Datura* species), henbane (*Hyoscyamus niger*), tobacco (all *Nicotiana* species), and the deadly nightshade (*Solanum nigrum*). The toxic principle of the nightshade family is a group of several alkaloids that are steroidal in nature. Most members of this family found in the US are herbaceous vines planted for food or aesthetic purposes.

Tomatoes (*Lycopersicon esculentum*) are actually a vine (which is why we need to stake them!) and were originally classified by botanist as a member of the deadly nightshade genus, *Solanum*. Poisoning from ingestion of the unripe fruit and/or green leaves of tomatoes was, and, unfortunately, is still common. Cattle, pigs, and even children (Lewis and Elvin-Lewis, 1977) have been poisoned by ingestion of portions of the plants. The leaves have proven to be particularly toxic to cattle and pigs. Numerous reports exist of poisoning from ingestion of the "suckers" removed from the plants by gardeners and innocently fed to livestock

(Kingsbury, 1964). Cattle are known to be particularly prone to intruding into a fenced garden and ingesting immature tomato plants. Other weedy members of the Nightshade family that I find common around my fields are: jimsonweed (*Datura stramonium*), horse-nettle (*Solanum carolinianum*), and black nightshade (*Solanum nigrum*). However, I have found that with good pasture present, neither our alpacas nor llamas show any interests in grazing these species.

Signs of Poisoning: Solinaceous poisoning is quite variable and is difficult to recognize. They include apathy, vomiting, difficulty breathing, prostration, the pupils of the eye may (or may not!) be dilated, and you may see either constipation or diarrhea.

Management: Make sure to fence garden areas securely so that livestock cannot visit your garden's salad bar. Dispose of culled plants, suckers, and clippings of solanaceous species properly; do not feed them to livestock! While I try to pull all solanaceous plants from my pastures and fence lines, I find it nearly impossible to keep up with them (they are brought in by the bird droppings and tend to grow quickly!). Therefore, the first, and most important control for the alpaca and llama owner is to maintain ample and good pasture for your animals.



Heath (Blueberry) Family (includes the andromedas, laurels, and rhododendrons)

The blueberry family is a very large group of trees, shrubs, and vines. Members of the family are found throughout the US and a number of genera have been shown to be poisonous to livestock and people. The Delaware Indians used an extract of the mountain laurel (*Kalmia latifolia*), a

common shrub of the eastern US, to commit suicide (Lewis and Elvin Lewis 1977). Other members of the genus, sheep laurel (*K. angustifolia*) and pale laurel (*K. polifolia*) have also been known to poison livestock. Several species in this family, including western dog hobble (*Leucothoe davisiae*), rhododendron, and azalea (both belong to the genus *Rhododendron*), are known to have poisoned camelids (Johnson 2003). The principle toxin is a resin, andromedotoxin (however arbutin, a glycoside of hydroquinone, is also present) and all portions of the plants are toxic, either green or dry. Other members of the family known to be toxic include: Pacific Labrador tea (*Ledum columbiana*), fetter bush (*Zenobia speciosa*), mock azalea (*Menziesia ferruginea*), Japanese pieris (*Pieris japonica*), three species of laurel (*Kalmia angustifolia*, *K. latifolia*, *K. polifolia*) and several species of rhododendrons and azaleas (all *Rhododendron* species). Members of this family are, for the most part, avoided by livestock except under poor pasture conditions. However, in at least one situation I have observed llamas grazing on planted azaleas, even though plenty of pasture was present. The owner later informed me that there were no ill effects.

Signs of Poisoning: Signs of poisoning in livestock include repeated swallowing, copious salivation, slow pulse, lowering of blood pressure, convulsions, progressive paralysis, and death (Kingsbury 1964, Lewis and Elvin-Lewis 1977, Knight and Walter 2001).

Management: Since it is known that these plants are toxic to camelids, I strongly recommend removing members of this family, particularly of the genus *Rhododendron*, from areas where animals are allowed to graze. If an owner wishes to continue using members of this family as ornamentals, make certain the animals do not have access to them. Eradication is fairly simple. Most of the plants are fairly shallow rooted and can be pulled from the ground with a small tractor. I have had good success with cutting them off at ground level (remember to remove the cuttings from the grazing range!). While some grew back from the roots, a second cutting completed the job.



Oleander (Nerium oleander)

I include the oleander in this group since it is such a toxic species. Ingestion of a very small amount of the leaves, twigs, flowers, and fruits have caused death in livestock and humans. Kingsbury (1967) noted that the lethal dose for horses or cattle was 0.005% of their body weight; that would translate to 1/100 of a pound (approximately one leaf!) for a 100lb animal. The principle toxin is a cardiac glycoside (oleanderase nerioside) and has been diagnosed as a poison in llamas (Johnson 2003). All parts of the plant, green or dry, are toxic. As is the case with many other poisonous species, livestock will generally not graze this plant if good pasture is available.

Signs of Poisoning: Signs include increased pulse rate (will decrease rapidly in terminal stage), discoloration of the mouth (white instead of pink), vomiting, weakness, and bloody feces. If death occurs it will usually follow within a day.

Management: Oleander is a warm weather shrub that has been planted throughout the southern US for its attractive flower. It is not found in nature. Therefore, it is recommended that 1) DON'T PLANT IT, and 2) if it has already been planted and the owner wishes to keep it, make sure that no animals are allowed to graze it. If pruned, make sure that clippings are removed from any grazing areas. Oleander tends to be shallow rooted and can usually be pulled from the ground with a small tractor. Cutting back is less successful as Oleander, like black cherry, tends to sprout numerous new shoots from its roots. Use of an approved woody herbicide may be appropriate, but follow directions carefully and keep livestock from treated area.

Yew (members of the genus Taxus)

Yew is an evergreen conifer of which seven species are found distributed throughout the US. Most, including the Pacific yew (*T. brevifolius*), from which

the cancer drug, taxol, was first extracted, are rare. Unfortunately, the most common species are two old world species planted as ornamentals (*Taxus baccata* from Europe and *T. cuspidata* from eastern Asia) and are the most toxic members of the family (particularly *T. baccata*). Larue Johnson (2003) has noted that llamas have been poisoned by yew. The actual species, however, was not available. Other species include the Pacific yew on the west coast, southern yew (*T. floridana*) in Florida, and eastern yew (*T. canadensis*) in northeastern US. Deer have been known to browse *T. canadensis* with no negative affect, however, death to livestock due to heavy grazing on the species have been reported (Kingsbury 1964, Erichsen-Brown 1979).

Signs of Poisoning: This plant causes sudden death. Animals have actually been found with twigs and leaves hanging out of their mouth! In some cases animals have shown no signs before succumbing to the toxin. In others, animals have shown nervousness, trembling, difficulty breathing, and diarrhea.



Management: Since the problem species appear to be the planted ornamental varieties, livestock owners are strongly advised to either block access to (including accidental access!) or to eliminate any ornamental yews. If yews are maintained on the property, it is important to remember that if trimmed, the trimmings must be disposed of properly since drying of the leaves does not destroy the toxins! Unfortunately yew is a species that animals will graze even under good pasture conditions. Therefore, even if you have the less-toxic native species found near or on your ranch, I suggest that you remove them from grazing areas and/or fence your animals from non-grazing zones where they may be located.

Pasture Safety & HAZARD AWARENESS

Component	Comments	Examples
Alkaloids	Most common type of toxic component found in plants. They are basic in reaction and form salts. Some form a neurotoxin that can cause sudden death.	belladonna, jimsonweed, poison hemlock, tomato, tobacco, potato, larkspur, death camas, poppy
Polypeptides and Amines	Rare in nature	mistletoe, ergot, death angle, some blue-green algae
Glycosides	Fast acting, extremely difficult to treat. Causes difficulty breathing, staggering, coma, and may cause sudden death. Common in Rose family.	cherry, elder, Johnson grass
Oxalates	Can reduce amount of calcium absorbed. Can be fatal if large quantities ingested under minimum dietary calcium uptake.	spinach, rhubarb, beet, dock, sorrel, Russian thistle (ramble-weed), dumb-cane, elephants-ear
Resins (resinoids)	Grouped by physical properties: chemical structure soluble in organic solvents, insoluble in water.	milkweed, water hemlock, laurels, Labrador tea
Phyto toxins	Protein molecules of high toxicity found in only a few plants. Act as antigens in bloodstreams that can elicit an antibody response. May also cause a lethal accumulation of ammonia. Seeds tend to be most toxic.	castor bean, black locust, precatory bean
Mineral poisonings	Copper, lead, cadmium, and manganese may be ingested as secondary deposits of insecticides and herbicides. Nitrogen poisoning may occur from ingestion of a number of weedy and/or crop species. Selenium poisoning is particular troublesome on ranches located in the foothills of the Rockies east to the Mississippi River Valley. It is rare on the east coast. Molybdenum in soil may be too high or too low and may cause reaction with copper uptake. It is found on alkaline soils	Nitrogen: poison hemlock, pigweed, sweetclover, smartweed, goldensrod, Johnson grass, oat hay, cucumber Selenium: asters, locoweed, salbrushes
Compounds causing Photosensitivity	Hypersensitivity to light appears to be caused by pigments that form in the peripheral bloodstreams which is normally not found there.	St. Johnswort, buckwheat, lettuce, alfalfa, clover, vetches

Summary

Luckily for us, Camelids do not appear to be as susceptible to poisonous plants as cattle, horses, and/or sheep. Therefore, with a little bit of knowledge, our job to keep our alpacas and llamas safe is quite simple. First and foremost, we can minimize the potential ingestion of poisonous plants by providing good pasture for all our animals. It has been my experience that even with some poisonous species around, alpacas and llamas tend to ignore the toxic ones when they have plenty of orchard or

timothy grass to chew on. However, I would watch crias closely as they have not quite "figured-it-out" and may experimentally feed on the wrong species. Second, DO NOT feed cuttings from gardens, or decorative shrubs, to your animals. Some of our most innocent looking garden and landscape species are quite poisonous and should be discarded properly. Third, to that end, we also need to keep our animals from wandering into our gardens and lawns and grazing on garden or landscape plants. Remember, some of the more toxic plants are the ones we plant! Finally, we should familiarize ourselves with the most toxic plants from our area and remove them from our pastures and fence lines. A short note on pasture maintenance: the plants we want to predominant in our pastures may not compete as well as some toxic species (such as Johnson grass). Therefore, we may need to help desirable grasses to flourish by removing the undesirable species from competition, just like weeding our gardens.

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To help the reader establish a poisonous plant management plan I have provided a short list of references below that can use as a starting point. Your local vet, local colleges and universities (ask for a "botanist"), agricultural extension service agents or agencies, or garden clubs can usually point you in the right direction for you area.

Literature Cited and Recommended Reading (*)

- Erichsen-Brown, C. 1979. *Medicinal and Other Uses of North American Plants*. Dover Publications, Inc. New York, NY. 512pp.
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- *Kingsbury, J.M. 1964. *Poisonous Plants of the United States and Canada*. Prentice-Hall, Inc., Edgerwood Cliffs, NJ. 626pp.
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