



Veterinary Science Information

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POISONOUS PLANTS OF PENNSYLVANIA

Many plants are potentially poisonous to livestock. The conditions for causing plant poisoning are, in most cases, more important than the plants themselves.

Factors Contributing to Plant Poisoning

- A. Undernourishment, Starvation. This is the most common reason why animals eat poisonous plants. Pennsylvania woods and natural meadows contain many species of plants which are capable of killing animals. These woods and meadows are not good sources of forage for livestock. In early spring, late fall or during dry seasons when forage is scarce, animals may eat plants they would not eat under normal circumstances. *This reason is one of many good reasons why domestic animals should never be turned into woodlands for "pasture."*
- B. Accidental Poisoning. Some very poisonous plants may be accidentally eaten as animals graze. Water Hemlock is one of these. In early spring, animals hungry for green grass seek young grass growing along water courses where Water Hemlock lives. The Water Hemlock plants at this season are a small whorl of leaves growing on a heavy carrot-like root. One crown of such a root bitten off by an animal and eaten, as the animal eats grass, will kill a large horse or cow. Similarly, the two-leaf stage of the common Cocklebur is extremely poisonous when accidentally eaten by hogs foraging in old cornfields. Corn cockle, formerly a very common weed in wheat and barley fields has poisonous seeds which can produce symptoms of poisoning when enough of the seed contaminates grain fed to poultry.
- C. Browsing Tendency of Animals. Well-fed animals in dry lots or the best of pastures may become bored with the same constant diet. Out of sheer boredom or a craving for variation in diet they may browse weeds or shrubs available along fence rows. All grazing animals like to vary their diet with a little browse and many ornamental and wild plants may be consumed--not because they are palatable, but simply because the animal craves variation in its diet.
- D. The Amount of the Plant Eaten. The amount of the poisonous plant consumed may be the most important factor in determining why animals are poisoned. This is particularly true of cyanogenetic plants, nitrate-accumulating plants and those causing photosensitivity. This will be explained in the section where those plants are discussed. Some plants capable of severe poisoning can be very well utilized if they complement a good diet. This is particularly true of nitrate-accumulating or cyanogenetic plants.



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- E. Conditions Under Which Plants Grow. Cold, dark weather greatly increases the nonprotein nitrogen content of many warm-season plants. Sorghum-sudan hybrids, many grasses, alfalfa and corn may have dangerously high levels of non-protein nitrogen under such conditions. Excessive application of N fertilizers may foster toxic accumulations in weather unfavorable for plant growth. Drought may similarly affect cyanogenetic plants (sorghum, sudan grass, prunus species) so that toxic concentrations of cyanide are present.

Kinds of Poisonous Plants

- A. Cyanogenetic Plants - Those which contain poisonous amounts of hydrocyanic acid (HCN). Hydrocyanic acid ties up blood hemoglobin and a sufficient amount of HCN intake quickly kills animals by suffocation. Lesser amounts may be sufficient to kill a fetus or cause shortness of breath (dyspnea) when the animal exercises.

The Prunus Family - All wild and domestic plants of this family - The Cherry Family -contain a glycoside in the green leaves. When leaves wither, the glycoside breaks down into HCN and sugar. Animals which are not especially fond of green cherry leaves will seek out and eat withered leaves, because these are more palatable, with disastrous results. At times, a few handfuls of wilted choke cherry leaves may be capable of killing a mature cow. This type of poisoning should always be suspected when animals die suddenly following violent storms during the pasture season. Control - The only safe way livestock owners can eliminate wild cherry poisoning danger is to pull out the plants or cut them down and treat the stumps anytime there are no leaves present. Spraying wild cherry leaves with herbicides will make them deadly until the leaves are completely dry.

Sorghum, sorghum-sudan hybrids, and sudan grass are cyanogenetic plants. Research at Penn State has shown that sorghum and sorghum-sudan hybrids under 36" in height may contain deadly amounts of HCN. Aftermath of these plants is extremely dangerous after a frost or dry spell. Sorghums and sorghum-hybrids can be safely fed to livestock if:

1. They are at least 36" tall when fed.
2. They are not showing recent frost damage.
3. They are not used within five days following a rain during a drought period.
4. Aftermath material is made into silage before feeding it.

Whenever there is any possibility that these plants may be toxic they should be put in a conventional silo (not an airtight silo) and allowed to ferment for at least two weeks before using as feed. During dry periods it is not wise to feed these plants alone as the sole source of forage. Sudan grass is much safer than sorghum or sorghum-sudan hybrids. Toxic levels of HCN are usually only present immediately after a killing frost has damaged the green leaves. Thoroughly frost-killed sudan grass pastures have been eaten to the ground with no ill effects if the grass has been allowed to dry out for a few days before feeding it. Sudan grass growing between 12" and 36" tall have insignificant amounts of HCN. The margin of safety using sudan grasses during dry periods is much greater than for sorghum or sorghum-sudan hybrids for both HCN and nitrite-nitrate poisoning.

- B. Plants Containing Poisonous Alkaloids - Textbooks list a host of native and ornamental plants of Pennsylvania which contain deadly alkaloids. Alkaloids usually produce symptoms affecting the nervous system. Convulsions, teeth grinding, abnormal movements or conduct, abnormal heart rate, diarrhea or constipation may be observed. Fortunately, most of these plants are extremely unpalatable.

1. Kinds of Alkaloid-bearing Plants

- a. Water Hemlock and Poison Hemlock - contain a potent, deadly alkaloid--conine. It is rare, indeed, that animals which eat this plant (usually the root crown in early spring) are observed sick or dying. They are usually found dead not far from where they have eaten the plant.
- b. Poison Hemlock - is a more attractive plant than Water Hemlock. This is the "hemlock" that dispatched Socrates so swiftly. It is often used as an ornamental plant in farm gardens. The flowers, resembling Queen Anne's Lace, are often used for large mixed flower arrangements in country churches and social events. In fertile, moist soil, both Water Hemlock and Poison Hemlock may reach massive proportions. Plants six to eight feet tall are common.

Control - The only safe time to remove these plants is in the summer when they can be found easily and pulled out. Be careful not to contaminate drinking water with juices from damaged roots. This plant is common in all of the central, northern and western parts of Pennsylvania. No livestock owner can afford to take the risk of harboring this plant on his farm.

- c. The Nightshade Family - This large family of plants of which the common potato is a member, are all poisonous to at least some extent. The leaves of most species are poisonous, and the unripe berries are especially toxic. The alkaloid present, solanine, produces both severe nervous system and digestive system disturbances. A few interesting and important members of this family in Pennsylvania: Black Nightshade (Deadly Nightshade) is a common weed. The green berries of this plant are deadly, but the ripe berries are used in some parts of the country to make a delicious jelly. A cultivated form, the "Wonderberry" is an improved variety of this weed. European Nightshade - This attractive vine is common throughout the state. It produces clusters of green berries which ripen through yellow and orange to a beautiful translucent red color. The berries and foliage are poisonous. Children eating the berries develop severe gastrointestinal symptoms. Prickly Nightshade (Horse Nettle) - The poisonous plant textbooks give this common spring pasture plant a very bad reputation. Actually animals refuse to eat it even when they are very hungry. Jerusalem Cherry - This common and beautiful house plant has brilliant orange berries which are poisonous to children and pets.

The green berries of the common potato have a reputation for being quite poisonous when eaten. Both the sprouts and green potatoes which grow at the soil surface have been responsible for fatal poisoning in humans.

2. Other Common Alkaloid-Containing Wild Plants

Blood Root, May Apple, Lupines, Aconites (monkshood), Jimson Weed, Pokeweed and Anemone.

3. Some Cultivated Plants Which Contain Deadly or Medically Useful Alkaloids

- a. Belladonna - "The source of atropine, used to dilate the eye, slow down peristalsis, dry up bronchial mucous, etc.
- b. Digitalis - (Foxglove) - Important heart medicine. The drug slows and strengthens the heart rate and action.
- c. Delphinium - (Larkspurs) - Both wild larkspurs and garden varieties are poisonous.
- d. Lily of the Valley

C. Photodynamic Plants - Those which produce photosensitization. Conditions necessary:

1. The animal must have white areas of skin (unpigmented).
2. The animal must eat a sufficient quantity of the plants.
3. The animal must be exposed to bright sunlight.

The typical history usually reveals that animals suddenly become sore on the white areas of their bodies. Whole areas of white skin may raise up and slough off. White pigs and white cattle may die from this condition.

Common Plants Which Cause Photosensitization are:

Rape, Alsike Clover, Buckwheat, St. John's Wort, ornamental hypericums. Both St. John's Wort and ornamental hypericums have showy golden-yellow flowers. They are not readily eaten by animals. White hogs frequently become badly "sunburned" when they are on rape (canola) pasture in bright, sunny weather with little or no shade. Alsike clover frequently produces symptoms in dairy cows. White sheep which are turned into buckwheat stubble in bright fall weather may develop severe "sunburning" of the areas unprotected by heavy wool coats. Black-faced sheep are said to have originally been developed in pastures in Europe where St. John's Wort is a very common weed and the severe burning became a serious problem.

D. Plants with Poisonous Seeds - These seeds usually contain a high percentage of poisonous material. Some examples:

Corn cockle - the common rose-colored flower found in grain fields. Small amounts of cockle in poultry or animal feeds may produce intestinal irritation, diarrhea or vomiting.

Castor beans - the seeds of this common ornamental plant are very toxic to all species of livestock.

E. Ornamental Plants - Generally speaking there are very few exotic and native plants and shrubs used for ornamental purposes which are not poisonous to at least some extent.

Yews - all species are very poisonous. The toxic principal, taxine, is extremely powerful; it produces a slow, weak pulse and violent convulsions. Yews are toxic for all animal species.

Oleander - a beautiful houseplant often set out along the garden fence for the summer. Very deadly. Eating .005% of the animal's body weight is enough oleander to be fatal.

Snow on the Mountain, Larkspur - these two plants commonly escape cultivation and become naturalized in pastures adjacent to gardens. This plant has a milky sap resembling that of milkweed. It is safe to say that any ornamental or wild plants which contain a milky latex-like sap should be considered dangerous. Both are poisonous.

Broad-leaf Evergreens - Laurels, Rhododendrons, Pieris and most others of this group can poison domestic animals, particularly goats. They are generally unpalatable and poisoning cases are uncommon.

F. Miscellaneous Important Poisonous Plants for Pennsylvania

Black Locust - The bark and leaves of this plant are especially poisonous for horses and goats. Animals show depression, weak heart action and severe gastroenteritis.

Red Maple - Consumption of bark and leaves can induce a serious or fatal anemia in horses.

Bracken Fern - this "fern on a stalk" is extremely common in Pennsylvania. Animals eat it only when they cannot find anything else. It is interesting that bracken poisoning symptoms are quite different in different animals. Monogastric (one-stomached) animals such as the horse and pig suffer poisoning from the thiaminase principal of the plant which destroys thiamine (vitamin B1). Large amounts of bracken in hay must be consumed before the horse shows symptoms, but the green fronds and especially the fresh rhizomes are much more toxic. Horses show incoordination, jaundice, muscular twitches and convulsions. Emergency treatment with vitamin B brings about dramatic recovery.

In ruminant animals such as the cow and the sheep, much more bracken fern can be eaten before poisoning develops, and the symptoms are quite different. Bracken has an accumulative effect. Cattle can eat a small amount of this plant for an entire season with no visible effect. In Pennsylvania, it is an important problem where young cattle are turned onto dry woodland areas for pasture. They soon eat the available safe herbage, and then consume increasing daily amounts of bracken. Symptoms may occur within a few weeks, but several months is the more common situation. Sheep and cattle develop fever (104°), are listless, dull coated, and small hemorrhages may be seen on the mucous membranes. The animals die from massive internal hemorrhages. Treatment of cattle poisoned by bracken-fern is not successful as it is in the horse. Most animals showing symptoms die.

Pokeweed (Pokeberry, Inkberry) - Berries of this common weed will cause severe inflammation of the digestive tract when they are eaten by animals. Heifers in drought stricken pastures may develop a severe bloody diarrhea from eating pokeberries.

White Snake Root - This plant is very much like ageratum in leaf and flower form. It is taller and has looser heads of white flowers. It is very common throughout most of Pennsylvania. Cattle eat it only when there is no other forage available. This plant causes "trembles" and weakness in cattle and the poison is carried over through the milk. In humans, the condition is known as "milk-sickness." Numerous fatal cases in humans were reported in the Midwest around the turn of the century.

Jimson Weed - This weed is extremely common in hog yards. All parts of the plant are very poisonous, but they are only eaten by starving pigs or cattle. Symptoms: nausea, staggering and circling, loss of sight and death in convulsions.

Molds - Mycotoxins which are poisonous principles produced by molds may, for the most part, escape recognition. Certain molds in silage or grain (moldy corn poisoning) appear to cause severe brain damage, and affected animals show central nervous symptoms (circling, incoordination, staggering, paralysis and rapid death). Other fungi are less toxic, but they produce varying amounts of damage. The rhyzoctonia mold which is commonly found on rain damaged red clover hay may produce severe irritation of the tongue and mouth affecting the appetite and profusing copious drooling of saliva. This is particularly true with horses in which it is difficult to feed any red clover hay for this reason.

Ergot - This fungus disease of many native and domestic grasses is found most frequently on rye and rye grasses. Black masses along the seed heads are usually produced by this fungus. Wet, dark weather favors the formation of this fungus on these plants. Ergot causes disintegration of red blood cells, sloughing of the ends of the ears and tail, abortion and, in severe cases, death from exhaustion.

Mushrooms - There are many so-called rules by which one is supposed to be able to distinguish safe from deadly poisonous wild mushrooms. Even the experts disagree on how to tell the edible from inedible species. Do not eat wild mushrooms unless you are absolutely certain that the species is non-poisonous. Some poisonous species are rendered safe by cooking; others are rendered unwholesome by cooking. The safest mushrooms to eat are domestic mushrooms grown under cultivation. Even these may not be wholesome if stored too long or harvested when too old and partially decayed.

Nitrate-Nitrite Poisoning - During periods of stress, many plants accumulate toxic quantities of nitrate or nitrites within their tissues. Sudden cold weather, drought, for the first four or five days after a good rain following drought, excess nitrogen fertilization may produce an accumulation of nitrates or nitrites. Excessive intake of these compounds ties up the oxygen-carrying capacity of the red blood cells and symptoms are directly proportional to the amount absorbed. Also important is whether or not the nitrate bearing forage forms the major part of the diet. Cattle seem to be able to handle much more nitrate if they are receiving at the same time high-energy supplement or other forage. The symptoms may vary with the amount eaten, stage of gestation and the activity of the animal. Stabled animals or those fed in a dry lot appear to tolerate larger amounts of nitrate than those which are free to exercise. Cows receiving too much nitrate may show only shortness of breath when forced to walk for a few hundred feet. Abortion results if the amount eaten results in asphyxiation of the fetus. Many other symptoms are described: indigestion, poor rumination, milk depression, ketosis, and failure to come into heat, etc.

Nitrate Accumulating Plants - Annual Grasses - Oats, corn, wheat, rye, sorghum, sudan, etc., in approximately that order. Most broad-leafed weeds (lambs-quarter, pigweed, smartweed, plantains) may accumulate large quantities under stress. Common shrubs which may be browsed during dry weather may accumulate excess nitrate levels. Ordinary Canada Thistles, rarely eaten by cattle, are readily eaten when cut and wilting. These have been incriminated in several herd abortion problems.

How to Handle Forages Suspected of Excess Nitrate Content - Wait until weather conditions return to normal before feeding. For example: Corn dangerous for green chopping or small grain for pasture, if still alive after growing conditions return to normal, will quickly use up excess accumulated nitrate. Five days after a good rain, drought-stricken corn--if still alive--will use its excess nitrate. The only really safe way to utilize suspect material is to put it in a silo where it can ferment off the nitrate/nitrite material as complex nitrogen-oxygen gases. Do not use excessive nitrate bearing annual grains or grasses for hay.

Cyanide Bearing Plants - Other than members of the Prunus Family where cyanide is only present when leaves wither, some plants used for forage are dangerous accumulators of cyanide (HCN). Research at Penn State during dry seasons has shown that sorghums or sorghum-sudan hybrids may have dangerous levels of HCN when under 36" tall. Frosted aftermath growth may be especially deadly. Like nitrates, HCN ties up oxygen capacity of the blood, and death by asphyxiation is rapid. Emergency treatment may save some animals when HCN poisoning occurs, but this is not the rule. Especially dangerous is green chop feeding or pasturing sorghum or sorghum-sudan hybrids following rain in a dry season. It is best not to feed it unless it is at least 36" high and at least four or five days following a good rain. Ensiling sorghum or sorghum-sudan hybrids so that the HCN can escape through adequate fermentation (at least 2 to 3 weeks) is a good way to handle dangerous material. Frosted aftermath of this group of plants should never be considered safe as green chop, hay or pasture.

Sudan Grass - Sudan grass is infinitely safer than sorghum or sorghum-sudan hybrids as pasture and green chop. The precautions for the possibility of nitrate poisoning following rain in a dry season are recommended. Penn State research showed virtually no significant HCN in sudan grasses at any height in dry weather. The only HCN dangerous period for sudan grass occurs when the green plants are suddenly damaged by frost as on the morning after the first killing frost. The same very dangerous material is safe to feed after the plant dies and dries. The author has seen sheep and cattle eat standing sudan "hay" to the ground in late fall and early winter without ill effect.

Sweet Clover Poisoning - A slowly developing hemorrhagic disease of cattle is caused by ingesting damaged sweet clover hay or silage over a period of 2 to 4 weeks or more. The severity of disease is dependent on the age of animal (young are more susceptible) and the poison content of the forage. Toxic action is due to formation of dicoumarin (similar to Warfarin) in hay or silage. The disease never occurs in animals on sweet clover pasture. **Signs** - Are referable to hemorrhages into the tissues and occasionally into the digestive tract. Nose bleeding sometimes occurs; usually the most apparent symptom is doughy swellings in the dependent tissues (legs and abdomen) due to collection of blood. Stiffness of legs may be evident due to hemorrhage into joints and muscles. Definite anemia, rapid pulse and respirations, and weakness are terminal symptoms. Since blood loses clotting power, fatal hemorrhages may result from simple operations (dehorning, castrations, etc.) or from injuries at parturition.

Algae (water bloom) Poisoning - An acute, rapidly fatal poisoning of all species resulting from ingestion of heavy concentrations of certain fresh water algae. Condition occurs during hot weather, especially in dry season (drought) when algae are concentrated in stagnant water and animals are deprived of normal water supply. Animals which survive after ingesting sublethal amounts usually develop severe photosensitization. Symptoms -Approximate those of cyanide poisoning, but blood does not have cherry red color seen in latter disease. **Treatment** - Similar to cyanide poisoning and fairly successful if initiated soon enough.

Ergot Poisoning (Ergotism) - A chronic disease of cattle resulting from continued ingestion of a fungus ("smut") which grows on grains (rape, oats, wheat) and certain grasses (brome, bluegrass, rye grass). Poisoning usually occurs from feeding of hay and grains for a considerable period (2 weeks to several weeks) rather than from grazing. **Signs** - Usually lameness is initial sign, with hind legs affected first, followed by swelling and soreness of lower leg joints. Sensation is lost in affected part below a definite line of demarcation, and dry gangrene in distal portion results in eventual sloughing of that portion. Tail and ears may be similarly affected. Body temperature is high in initial stages and normal to subnormal in later stages. There is no treatment other than removing animals from further contact with the poison and treating symptoms; in advanced cases treatment is useless.

Fescue Poisoning - The condition "fescue foot" in cattle and rarely in sheep, has appeared following the use of tall fescue grass alone for pasture. The "dry gangrene" condition of the feet resembles ergot poisoning but the other "ergot symptoms" do not occur. The cause is not ergot or an ergot-like growth in the seeds' heads. Actually, the condition can be produced if only the grass leaves are fed. Tall fescue grass is one of the least palatable grasses for cattle or sheep. If any other edible plant is present in the pasture mixture, cattle will not eat enough tall fescue grass to develop this condition. Tall fescue grass should never be planted as the sole species of grass in a pasture for long-term grazing by cattle or sheep.

Reference Books on Poisonous Plants

"Poisonous Plants of Pennsylvania." Robert J. Hill. Pa. Department of Agriculture. 1986. ISBN-0-8182-0078-2.

"Poisonous Plants of the United States and Canada." Kingsbury, Prentice Hall, Inc., Englewood Cliffs, New Jersey.

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