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Awareness of Potential Plant Toxicity to Grazing Animals

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How important is the subject of toxic or poisonous plants to livestock or equine producers?

Effects on animal health from consuming or contacting potentially toxic plants can range from none to death. Potential deleterious effects include skin irritants, tainted milk, liver or kidney damage, cardiovascular, nervous system, musculoskeletal, or gastrointestinal problems, photosensitization or allergic reactions; birth defects or reproductive failure; nitrate poisoning; or sudden death. To protect the financial and often emotional investments in animals, it is important to have an awareness of how toxic plant poisoning most often occurs. In addition, weeds negatively affect the longevity and productivity of pasture and hay crops. Therefore, it is important to scout for toxic plants and other weeds in (and adjacent) the grazing area and adjacent to it is important.

It is difficult to make generalizations about toxic plant species. Plant species with toxic potential (the ability to cause detrimental effects) are found among a wide variety of plants. The toxic potential of a plant species depends upon several factors, including the species of animal exposed and the dose or amount of toxin consumed or contacted. The age, size, health, sex, or reproductive status of the animal may also be important. "Poisonous" or "toxic" does not mean deadly. The effect can be subtle. The dose, as always, determines if a plant is a safe source of nutrients or a toxic hazard.

Toxins within a plant can be confined to one or more plant parts (seeds or nuts, rooting structures, cotyledons, stems, leaves, or bark), or all parts can be toxic. For example, only the seeds and cotyledon stage plants of common cocklebur contain toxins; the bulbs of Star-of-Bethlehem contain higher toxin levels than other parts, yet almost all parts of yew and boxwood are highly toxic.

Toxin levels can fluctuate with certain environmental conditions (alsike clover during high rainfall; high humidity), during certain seasons of the year (spring fructan toxicity with ryegrass species, oats, and others), or when a combination of factors occurs. In some species (poison hemlock), the toxic principle or compound remains in preserved forage (hay or silage). In other species, these practices reduce (hairy vetch) or eliminate (buttercup species) toxin levels. Some tree leaves are more toxic after they have wilted (red maple, wild cherry). Toxic compounds associated with forages often reduce the quality of the feed (sometimes referred to as antiquality compounds). Several of the forage-related disorders result from toxins released by fungi (fungal endophytes) growing in association with the host forage plant (tall fescue toxicosis, ryegrass staggers, red clover slobbers, etc); fungi in moldy hay, silage, or clippings (botulism, sweet clover poisoning); or undesirable bacteria in improperly ensiled forage (listeriosis). Blister beetle poisoning in horses often results from consuming a toxin found in dead beetles baled into alfalfa hay.

A complete list of plants that are potentially toxic to all grazing animals is daunting and will not be attempted in this information piece. There are many

sources of detailed information, both printed and internet-based, on poisonous or toxic plants. Some references are included at the end of this document.

Below is a sampling of plant families and species with toxic potential (either naturally occurring or fungal-related).

- Beech family – oak species
- Box family (highly toxic) – boxwood, pachysandra
- Buckwheat family – buckwheat, dock species, rhubarb
- Buttercup family – buttercup species, baneberry, larkspur species
- Heath family (highly toxic) – azalea, rhododendron, mountain laurel
- Legume family – black locust, crown or hairy vetch, golden chain tree, lupine species, pea species, alsike clover, sweet clover, red and white clover
- Lily family – autumn crocus, lily-of-the-valley, star-of-Bethlehem, hyacinth species, skunk cabbage, onion and garlic (both wild and cultivated), tulip, asparagus
- Maple family – red maple
- Nightshade family – nightshade species, jimsonweed, ground cherry, horsenettle, tomato, potato
- Rose family – wild black cherry, chokecherry
- Yew family (highly toxic) – English or American Yew
- Other species – black walnut (shavings used as bedding), bleeding heart, burning bush, cocklebur, dogbane species, foxglove, ground-ivy, horse chestnut species, horsetail, johnsongrass, milkweed species, oleander, pigweed (amaranthus species), poison hemlock, pokeweed, privet, ryegrass species, shattercane, St. John's wort, tall fescue, water hemlock species, white snakeroot

This list does not include several species that are highly toxic but are rarely consumed by animals, or all species that have the potential to accumulate nitrates under certain conditions.

The following are examples of how many toxic plants or antiquality issues often occur under one or more of the following circumstances.

Most grazing animals do not "prefer" toxic plants when an adequate quantity of safe, nutrient-balanced forage is available.

Circumstance: Grazing animals consume toxic plants when they are undernourished in an attempt to provide caloric intake (energy) or balance a nutrient deficiency. Undernourished animals may consume large quantities of toxic plants, possibly over long time periods.

> **Solution:** Maintain forages to produce a nutritious feed source; or provide grazing animals with supplemental feed such as high quality hay or prepared feed.

Circumstance: Grazing animals consume toxic or antiquality compounds when the available forage is not suitable for the given class of animal. Quantities consumed will be large unless grazing time is limited.

> **Solution:** Provide forage types and varieties that are suitable for the class of livestock being grazed. If poor-quality forage must be used, limit grazing time and provide supplemental forage or feed.

Circumstance: Grazing animals consume toxic compounds when allowed to forage on certain species during the wrong growth stage (prussic acid poisoning), while experiencing environmental stress (nitrate poisoning), or during rapid growth and imbalanced fertility (grass tetany). Quantities consumed will be large unless grazing time is limited.

> **Solution:** Understand when specific forage species should not be grazed or are subject to accumulated toxins; maintain appropriate fertility, do not overapply nitrogen (particularly during drought), and have forage tested when conditions for potential toxicity exist.

Most grazing animals are curious eaters and will sample newly introduced or discovered food sources.

Circumstance: Grazing animals consume toxic plants that were previously unavailable when they are introduced to a new pasture, woodland grazing area, or other food source containing toxic plants. During the adjustment phase, the quantity consumed may be small unless the new food source is dominated by the toxic species or the animals are undernourished.

> **Solution:** Scout new or renovated pastures or grazed woodland areas for potential problem species before turning grazing animals onto them. Also, scout fence lines and other areas where animals can reach plants that might attract their attention. Control or remove undesirable vegetation.

Circumstance: Grazing animals consume toxic plants that are accidentally introduced into the animal's current environment, or the animal accidentally enters a different environment. Quantities consumed may be small unless the introduced toxic species are the only "green" food source or the animals are undernourished.

> **Solution:** Place signage along fence lines where the public or other people have access to the pasture, requesting that they do not feed the animals and do not throw other plant material into the pasture. Ask close neighbors to honor the same request. Keep fences and gates repaired and posted.

Grazing animals require a minimum period of time (up to three weeks) to safely transition between food types (i.e., grain and/or hay to pasture, different forage species, etc.)

Circumstance: Otherwise suitable feed, hay, or forage can have deleterious effects when animals are transitioned too quickly (colic, laminitis, bloat). Quantities consumed will be large if transitioning is ignored.

> **Solution:** Introduce animals to new feed sources gradually. Initially limit grazing time to a few hours a day after having fed a ration of hay or grain to help limit animals' appetites. Incrementally increase grazing times on the new introduction to the desired maximum over a two to three-week period.

To summarize the solutions, grazing animals should be provided with adequate pasture that meets their nutrient and energy requirements, or their diet should be supplemented with a balanced ration to reduce the chance that they will consume enough toxic plants to cause severe problems. Carefully control what food sources become available, make sure new foods are safe for the animal species, and make gradual transitions to new foods. Be aware of environmental, seasonal, and fertility conditions that may cause forages to accumulate toxic compounds, and test them if necessary. Scout for toxic plants, implement good forage and weed management practices, and remove dangerous plants from your property. Minimize the potential for accidental introductions of toxic plants via downed tree limbs, yard cuttings (especially ornamentals), or well-meaning neighbors. Provide animals with safe bedding materials. Scouting for toxic plants and other weeds should take place on a regular basis. Keep dated records of which weed species are found in each pasture or hayfield and where large numbers of them occur, particularly for problem weeds (biennial, perennial, woody, and poisonous species). Scouting in early spring, mid-summer, and late fall, when forages are not as lush, allows for easier location and identification of problem weeds. Scouting should also occur after each grazing cycle in a rotationally grazed system, monthly in a continuously grazed system, or one to two weeks after each hay cutting. Visits to pastures or hayfields to conduct other management practices (fertilizer applications, soil sampling, manure removal or dragging, etc.) provide excellent opportunities to scout. Proper weed identification is vital. Small plants in the cotyledon or seedling stages are more difficult to see and identify than mature weeds in the later vegetative or flowering stages, but small weeds are easier to control. Use the previous year's scouting records that noted concentrations of mature weeds to direct scouting efforts when weeds are in the seedling stage. Understand that plant populations may change

based on landscape positions such as upland areas, wet areas, forest edges, or floodplains. Pay particular attention to high traffic areas, hay feeding stations, bare spots, fence lines, and field edges where new weed infestations most often occur. In addition to scouting pastures and hayfields, it is important to know potential hazards outside the pasture fence. Sacrifice lots usually become nearly devoid of healthy forage due to severe grazing pressure and compaction, while many weeds are fit to survive under these conditions.

The bottom line of managing toxic plants is to minimize your animals' exposure.

The following points will help:

- Partner with your local Cooperative Extension agent, forage or weed specialist from your university, and/or your veterinarian to determine which plants on or near your property can be toxic to your grazing animals.
- Use printed or online resources to help identify unknown species on your property.
- Minimize the potential for accidental introductions of toxic plants via downed tree limbs, yard cuttings (especially ornamentals), or well-meaning neighbors. Awareness and good-neighbor communication are important for success.
- Plant appropriate forage species; practice good cultural management to keep pastures productive; scout on a regular basis; and apply herbicides to control problem plant species when needed. Keep in mind that unless grazing animals are undernourished, they usually will prefer safe forages over toxic plants.
- When the amount of forage from pasture is insufficient to provide the animal's nutritional needs, provide species-appropriate, good-quality, weed-free hay or other preserved forage to supplement or replace nutritional needs.
- Make new forage introductions slowly. Some animal species require an adjustment period of two to three weeks to adjust successfully to a new food source without the threat of gastrointestinal or musculoskeletal disorders.
- Use the right type of bedding purchased from a reliable source.
- If you suspect plant poisoning has occurred:
    - Call a veterinarian immediately.
    - Remove all animals from the grazing area or the sacrifice lot.
    - Identify the suspected plants; consult Cooperative Extension personnel or other professionals.
    - Remove accidentally introduced plant material, or eradicate toxic plant species growing in the grazing area by hand-weeding, applying appropriate herbicides, pasture renovation, or other recommended practices.
    - Monitor the grazing area over time to ensure the toxic species has been eradicated.

Resources for Poisonous Plants

A Guide To Plant Poisoning of Animals in North America by Anthony P. Knight and Richard Walter.
ISBN # 1-893441-11-3
Teton NewMedia
www.tetonnm.com

Poisonous Plants of Pennsylvania by Robert J. Hill.
Pennsylvania Department of Agriculture
2301 N. Cameron Street
Harrisburg, PA 17110 1-717-787-4737

Cornell University Poisonous Plants Informational Database
http://www.ansci.cornell.edu/plants/

Resources for General Weed Identification

Virginia Tech Weed ID Page
http://www.ppws.vt.edu/weedindex.htmhttps://weedid.cals.vt.edu/

Weeds of the Northeast, Second Edition Joseph C. Neal, Richard H. Uva, Joseph M. DiTomaso and Antonio DiTommaso, Richard H. Uva, Joseph C. Neal, and Joseph M. DiTomaso
Cornell University Press, Sage House
512 East State Street
Ithaca, New York 14850
Usually available at www.amazon.com

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