Poisonous Plants in Pastures

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Your veterinarian will be the person to check with for symptoms, treatments, and cures
Introduction

- Poisonous plants far outnumber poisonings
- Animals generally prefer other plants to poisonous plants
  - Most plant poisonings occur when nothing else is available
    - Drought
    - Overgrazing
  - Animals purchased from a different geographic region
Individual animals within a species may react differently

Different types of animals react differently (e.g. cattle may be killed, but swine fine)
Prevention is the key!

- Identify the poisonous plants in your pasture
- Control or keep animals away from areas known to have poisonous plants
- Supply good forage or feed
- Avoid overgrazing
- No antidotes for many of the poisons in plants
Poisoning Symptoms

- Birth Defects
- Bleeding
- Blood Clots in Stool
- Blue Coloration
- Breathing Difficulties
- Death (Sudden)
- Diarrhea
- Drooling
- Dullness/Depression
- Excited/ Unusual Behavior

- Gangrene
- Heart or Pulse problems
- Jaundice
- Nausea
- Prostration
- Rash/ Sunburn
- Staggering/ Uncoordination
- Stomach Upset/ Colic
- Throat Irritations
- Trembles / Convulsions
If you suspect plant poisoning:

- Eliminate all other possibilities
- Positively identify suspected plant
- Match symptoms to those reported for plant
Poisonous Weeds in Pastures:

- Perilla Mint
- Cocklebur
- Poison Hemlock
- Spurge Family
- Hemp Dogbane
- Yew
Perilla Mint

(Perilla frutescens (L.) Britton)

- Found in moist areas along streams or wooded areas
- Mint odor
- Poisonous to all livestock
  - Contain ketones that cause acute respiratory distress syndrome
  - All plant parts poisonous, even in hay
Perilla Mint

(Perilla frutescens (L.) Britton)
Mowing
Grazon P+D, Weedmaster, Remedy, or 2,4-D containing herbicides
Apply when plant is actively growing – late April to early June
Perilla Mint
*(Perilla frutescens* (L.) Britton)*

- Green or dry, 3–substituted furans (perilla ketone, egomaketone, isoegomaketone).
- Signs 2–10 days after exposure include dyspnea (especially on exhaling), open-mouth breathing, lowered head, reluctance to move, death on exertion. Lesions include pulmonary emphysema and edema.
The seeds and cotyledonary seedlings are poisonous.
- Ingestion of seeds equal to 0.3% of the animal’s body weight
- Ingestion of seedlings equal to 0.75% of the animal’s body weight are lethal

Poisoning has occurred in all classes of domestic livestock, and is usually associated with cotyledonary seedling ingestion.
The symptoms are anorexia, depression, nausea, and prostration. Death may occur in a few hours to three days after the symptoms are first noted.

Grazon P+D, Grazon Next, Remedy, or 2,4-D containing herbicides
The leaves are finely divided, it has a fleshy, white taproot, and the main stem is hollow with light red spots.

The flowers are white clusters forming an umbrella shape.

The whole plant also emits a disagreeable smell.
Poison Hemlock
*(Conium maculatum L.)*

- All plant parts are poisonous
  - Seeds and early vegetative tissue contain the highest concentration
- Hay containing poison hemlock will remain toxic
- The toxic alkaloids coniine and y-coniceine primarily affect the reproductive and central nervous systems
  - Symptoms of poison hemlock consumption and poisoning include dilation of the pupils, reduced heart rate, coma, trembling, nervousness, and respiratory paralysis, which may eventually lead to death
  - Symptoms usually occur within a few minutes.
- Cattle, horses, and goats are the most susceptible livestock; sheep and pigs are less sensitive but can be affected
- Lethal amounts from 2 to 6 grams of plant material per pound of body weight in cattle, sheep, and pigs.
Poison Hemlock
(Conium maculatum L.)

- Hand-weeding, mowing, and tillage
- 2, 4-D mixed with Clarity (dicamba), Remedy, GrazonNext, Grazon P+D
- Apply the herbicide when plants are young and in the rosette stage of growth
Black nightshade
(Solanum nigrum L.)

- All plant parts very toxic
  - Berries are not as poisonous as remaining plant parts
  - Rarely consumed – unpalatable

- All class of animals affected
  - Contaminated hay, low forage availability, or bored animals (including pets) most sensitive

- Gastrointestinal tract and central nervous system affected
  - Signs can include abdominal pain, vomiting, diarrhea, incoordination, weakness, depression, hallucinations, and convulsions
  - Death rare – except in humans
Spurges
(Euphorbiaceae Family)

- Nodding Spurge
- Spotted Spurge
- Tropic Croton
- Wooly Croton
- Snow on the Mountain
- Others

#1 pasture weed complaint throughout the “fescue belt” in late summer 2010, 2011, and 2012
- Kevin Bradley State Weed Scientist
Spurges
(Euphorbiaceae Family)

- Nodding Spurge (*Chamaesyce nutans* (Lag.) Small)
Spurges
(Euphorbiaceae Family)

- Spotted Spurge (*Chamaesyce maculata* (L.) Small)
Spurges
(Euphorbiaceae Family)

- Tropic Croton
  \((Croton glandulosus\) var. \(septentrionalis\) Müll. Arg.)
Spurges (Euphorbiaceae Family)

- Wooly Croton (*Croton capitatus* Michx.)
Spurges
(Euphorbiaceae Family)

- Snow on the Mountain (*Euphorbia marginata* Pursh)
**Spurges**  
(Euphorbiaceae Family)

- **Poisonous**
- **Most contain milky sap**
  - All sap is poisonous when ingested
  - Large quantities must be consumed
  - Pain and swelling of the oral mucosa, blistering and open sores may be present
- **Cimarron, Cimarron Max, Chaparral, Grazon P+D, or GrazonNext**
- **Spray timing is important**
  - Summer annual – late summer
White Snakeroot
(Ageratina altissima (L.) King & H.E. Robins.)

- Found throughout Missouri
  - Wooded area, fence rows, pastures, and rocky areas

- Leaves, stems, and roots are toxic
  - Consuming 1–10% of body weight
  - Depression, stiff gait, muscle tremors, trembling, partial throat paralysis, jaundice, and passage of hard feces
  - Toxin is passed along in milk. Therefore, nursing animals are affected
Hemp Dogbane
(*Apocynum cannabinum* L.)

- Perennial
- White milky sap – toxic to livestock
  - Poisonous green or dry
  - 15–30 grams will kill adult horse or cow
- Very tough to control

**Milky juice**
Hemp Dogbane  
(*Apocynum cannabinum* L.)

- Repeated mowing
- Planting a smother crop – small grains
- Tillage of seedlings 6 wk. after emergence
  - Tillage of established plants spreads rootstock

Milky juice
Hemp Dogbane
(Apocynum cannabinum L.)

- Crossbow, Surmount, or Banvel/Clarity mixed with 2,4-D, GrazonNext, Grazon P+D
- Apply herbicide at the late bud to flower stage

Milky juice
Legume

Many thorns
- 2 short, sharp spines at base of each leaf stalk

Showy, fragrant flowers
- Ornamental varieties sold

Seed pods, young shoots, wilted leaves, and inner bark poisonous to livestock
- Poison can remain present in hay

Symptoms: depression, poor appetite, weakness, paralysis, abdominal pain, diarrhea, abnormal heartbeat, and death
Black Locust

(*Robinia pseudoacacia* L.)

- Multiple mowings
- Small sprouts
  - Grazon P+D total coverage of the leaves is needed
- Large trees
  - Basal Bark treatment with Pathfinder II
  - Cut Stump treatment with Tordon RTU
Honey Locust
(*Gleditsia triacanthos* L.)
Beware of Ornamentals

- Most ornamental plants are poisonous
- Keep livestock away from gardens

- Rhododendron
- Daffodils
- Foxglove
- Wisteria

Rhododendron | Daffodils | Foxglove | Wisteria
Yew
(*Taxus* spp.)

- Ornamental – native to Europe
- One of the deadliest trees on the planet
- All parts extremely poisonous
- Symptoms: Convulsion, paralysis, and sudden death
Common Toxins:

Nitrate Poisoning
Prussic Acid Poisoning
Endophyte Fungus
Ergot
Nitrate Poisoning

- Nitrates are normally present in plants
  - Plants take up nitrates then converts it to nitrite, then into protein
  - When the plant is under stress nitrates are stored in the plant until conversion into ammonia is possible
Ruminant animals are more susceptible than non-ruminant species because the microbes in the digestive tract favor the conversion of nitrate to nitrite.

Nitrate itself is not toxic to livestock, only when present in large amounts.
- Nitrates when consumed in low amounts are converted by the animal to nitrites, then ammonia, then made into protein.
If cattle rapidly ingest large quantities of plants that contain high levels of nitrate, nitrite will accumulate in the rumen.
  ◦ Nitrite is 10 times as toxic to cattle as nitrate.

Nitrite is absorbed into the blood stream and combines with hemoglobin (oxygen carrying molecule) to form methemoglobin.

Methemoglobin cannot transport oxygen as efficiently as hemoglobin, so the animal's heart rate and respiration increases, the blood and tissues of the animal take on a blue to chocolate brown tinge, muscle tremors can develop, staggering occurs, and the animal eventually suffocates.
Conditions Which Favor Nitrate Accumulation by Plants

1. Drought conditions
2. First rain after a drought
3. Frost and hail interfere with normal plant growth and can cause nitrates to accumulate in the plant.
4. Slow plant growth due to cool temperatures. Nitrates can be absorbed quickly by plants when temperatures are low, but conversion to proteins occurs very slowly in plants during periods of cool weather.
5. Heavy fertilization with nitrogen
6. Acidity, sulfur, phosphorus, or molybdenum deficiencies
7. Certain herbicides, including 2,4-D
## Nitrate Poisoning

<table>
<thead>
<tr>
<th>Common Plants Known to Accumulate Toxic Levels of Nitrates</th>
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</thead>
<tbody>
<tr>
<td><strong>Crops</strong></td>
<td><strong>Weeds</strong></td>
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<tr>
<td>Barley</td>
<td>Canada Thistle</td>
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<tr>
<td>Corn</td>
<td>Dock</td>
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<tr>
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<td>Jimsonweed</td>
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<tr>
<td>Millet</td>
<td>Johnson Grass</td>
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<td>Oats</td>
<td>Kochia</td>
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<tr>
<td>Rape</td>
<td>Lambsquarter</td>
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<tr>
<td>Rye</td>
<td>Nightshade</td>
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<tr>
<td>Soybean</td>
<td>Pigweed</td>
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<tr>
<td>Sorghum</td>
<td>Russian Thistle</td>
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<tr>
<td>Sudangrass</td>
<td>Smartweed</td>
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<tr>
<td>Sugar Beets</td>
<td>Wild Sunflower</td>
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<td>Sweetclover</td>
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Managing Nitrate Poisoning

- Conduct a nitrate test before feeding
  1. Qualitative Quick Test – at Extension Office
  2. Quantitative Lab Test
Managing Nitrate Poisoning

Guidelines for use of feeds with known nitrate content.

<table>
<thead>
<tr>
<th>Nitrate Concentration (%)</th>
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<th>Recommended Management</th>
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<tbody>
<tr>
<td>0.00 – 0.44</td>
<td>0 - 3000</td>
<td>Safe to Feed.</td>
</tr>
<tr>
<td>0.44 – 0.88</td>
<td>3000 - 6100</td>
<td>Safe when fed to nonpregnant animal. Limit to 1/2 of the total dry ration for pregnant animals and be sure water is low in nitrate.</td>
</tr>
<tr>
<td>0.88 – 1.50</td>
<td>6100 - 9200</td>
<td>Limit amount to 1/4 of total dry ration for pregnant animals</td>
</tr>
<tr>
<td>Over 1.50</td>
<td>Over 2100</td>
<td>Potentially toxic - do not feed.</td>
</tr>
</tbody>
</table>
Managing Nitrate Poisoning

- Nitrates in the plants are stable
  - Only the plant can convert the nitrates to safe forms
- Hay with high nitrate contents will *not* decrease with time

Test your Hay for Nitrates
Prussic Acid Poisoning

- Also called hydrocyanic acid poisoning or cyanide poisoning
- Results when livestock consume plants containing cyanogenic glycosides from which hydrogen cyanide (HCN) is released
  - Cyanogenic glycosides are formed as a response to stress
  - In certain plants cyanogenic glycosides are always present and breaking the plants cell walls releases the compounds
When cyanogenic glucosides are broken down in the rumen the cyanide is absorbed and combines with hemoglobin in the bloodstream. This prevents animal cells from receiving enough oxygen from the blood. The blood is able to transport oxygen from the lungs, but the tissue is unable to take up this form. Affected animals will have bright red blood since it is saturated with trapped oxygen. Suffocation results.
# Prussic Acid Poisoning

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<th>Common Plants Known to Produce Prussic Acid</th>
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<tbody>
<tr>
<td><strong>Crops</strong></td>
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<tr>
<td>Sorghum</td>
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<tr>
<td>Sudangrass</td>
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<td>Sweet Clover</td>
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Millets do not contain prussic acid
Native, deciduous tree
White flowers, drupe fruit
Bark is very dark and broken
Only poisonous when leaves are wilted
  ◦ Contain cyanogenic glycosides which convert to hydrogen cyanide when ingested by livestock
  ◦ Anxiety, difficult breathing, staggering, convulsions, collapse and sudden death
Control: Identification of trees and removal or exclusion
Endophyte Fungus

- Fungus found in stem, leaf sheaths, & seed
- Increases progressively season long
- Minimized in young growth

Roberts and Andrae, 2004
Endophyte Fungus

Endophytes produce chemical compounds known as alkaloids, which confer pasture pest resistance, but which can also cause animal health problems.

- Peramine deters feeding and egg laying of Argentine stem weevil, but has no known effects on animal health.
- Lolitrems deter Argentine stem weevil larvae feeding, but cause ryegrass staggers.
- Ergovaline gives resistance to black beetle, but causes heat stress, and fescue toxicosis.
Endophyte

- The endophyte forms a symbiotic relationship with the tall fescue plant
  - The tall fescue plant gets increased persistence and tolerance to drought, diseases, and insects
  - The endophyte gets food, shelter, and a means of reproduction
    - Only means of reproduction is through the seeds of the host
      - Infected plants come from infected seed
      - Non–infected plants come from non–infected seed
Endophyte

Endophyte is found in embryo of infected seed

The endophyte grows into the emerging leaf as the seed germinates

The endophyte is concentrated in the base of the plant, not in the roots

The endophyte grows up the stem and into the seed head of the reproductive plant
Problems with Toxic Endophyte Infected Tall Fescue

- Lower Conception Rates
- Retained Placentas
- Reduced Milk Production
- Agalactia
- Rough Hair Coat
- Higher Respiration Rates
- Fescue foot
  - Frozen nose, ears, tails, etc (in winter)
- Reduced Feed Intake & Reduced Weight Gain
- Increased Body Temperature (leads to heat stress)
- More time spent in shade or water/ Less time spent grazing
Endophyte Free Tall Fescue

- Endophyte can be removed
  - Long-term storage
  - Seed Treatments
- Eliminates the symptoms of fescue toxicosis

Roberts and Andrae, 2004
Endophyte generally necessary for persistence south of this line

(West, 1998)
Non Toxic Endophyte Infected Tall Fescue

Roberts and Andrae, 2004
Non Toxic Endophyte–Infected Fescue

- Novel endophytes (“Friendly”) retains the good qualities of fescue
- Available Varieties:
  - MaxQ
  - Advance
  - Bar–Optima
  - Others

<table>
<thead>
<tr>
<th>Location</th>
<th>AR4</th>
<th>E-</th>
<th>E+</th>
</tr>
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<tbody>
<tr>
<td>Fayetteville, AR</td>
<td>1.43</td>
<td>1.55</td>
<td>0.93</td>
</tr>
<tr>
<td>Mt. Vernon, MO</td>
<td>1.21</td>
<td>1.21</td>
<td>0.55</td>
</tr>
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</table>

West et al., 1998
Feedlot performance (lbs per animal) of beef cattle after grazing three types of tall fescue.

Cattle that previously grazed E- and E+++ tall fescue entered the feedlot 117 pounds heavier finished 108 pounds heavier than cattle that grazed E+ tall fescue.

Roberts and Andrae, 2004
The endophyte produces alkaloids which are **TOXINS**

Sample your pastures to determine the level of infection

- < 20% = Low Infection
- 20 – 35% = Moderate Infection
- > 35% = High Infection
Fescue Toxicosis Management

1. Stand replacement with a non toxic endophyte infected variety
2. Dilution of the toxin
3. Clip seed heads
   - Seed heads contain 5 times more toxins than other plant parts
   - Helps to maintain forage quality
Fescue Toxicosis Management

- Stand replacement with a non toxic endophyte infected variety

Roberts and Andrae, 2004
Dilution of the toxin

- Feed supplements
- Dilute with legumes
- Rotate to summer pasture
- Tall fescue only

Daily Gain (lb/acre)

E+  E-  E++
Fescue Toxicosis Management

- http://forages.oregonstate.edu/tallfescuemonograph/
Ergot

- Plant disease caused by the fungus *Claviceps purpurea*
- Affects grass plants, most commonly grain crops
- Severe poisoning causes convulsion or gangrene
  - Other symptoms: low milk production, retained placenta, foal death, and high body temperature
- Treatment: remove animals from contaminated pasture, graze susceptible pastures before seed production, and screen non-commercial feeds
Poisonous Weeds in Pastures:

- Soapwort
- Bracken Fern
- Buttercup
- Field Horsetail
- Jimsonweed
- Milkweed
- Wild Mustard
- Ohio Buckeye
- Black Nightshade
- Common Pokeweed
- Wild Indigo
- Oak
- Larkspur
- Others…
If an animal appears poisoned...

- Avoid disturbing animal as much as possible
- Contact your veterinarian
- Move animals to fresh pasture or give fresh feed/water
Poisonous Weeds

- Purdue University
  [http://vet.vet.purdue.edu/toxic/cover1.htm](http://vet.vet.purdue.edu/toxic/cover1.htm)
- North Carolina State University
  [http://plants.ces.ncsu.edu/plants/category/poisonous-plants](http://plants.ces.ncsu.edu/plants/category/poisonous-plants)
- Colorado State University
  [http://www.vth.colostate.edu/poisonous_plants/](http://www.vth.colostate.edu/poisonous_plants/)
- Extension Agent
Questions?