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CATTLE POISONING

What is a poison?

- A poison is often distinguished from a **toxin** and a **venom**.
- Poisons are generally defined as substances which are absorbed through epithelial linings such as the skin or gut.



Poison

- "Everything is poison, there is poison in everything. Only the dose makes a thing not a poison." - Paracelsus



Nitrate Poisoning

- Cause by consumption of excessive amount of nitrate
 - Crops
 - Hay
 - Silage
 - Weeds
 - Drinking water



Toxicosis

- Nitrate
- Lead
- Ergotism
- Aflatoxicosis

Nitrate accumulation in plants

- All plants contain nitrate
- Excessive amounts in excessive fertilization or stress
- Build up of nitrates in soil can be cause by excessive fertilization with poultry litter or animal manure
- Adverse environmental conditions can cause nitrate fixation in plants

Plant conditions

- Lack of sunlight
- Detrimental weather- Drought and high temperature
- Herbicides- 2-4 D may results in temporary high nitrates levels in plants
- Diseases- Destroy nitrate accumulation system in tissue
- Soil nutrients imbalance

Nitrates in plants

- Weeds
- Corn
- Sorghum
- Sudangrass
- Small grains
- Any high stem-to-leaf ratio plant (stemmy forage more of a problem)



Nitrates in plants

- Highest in young plants
- Before flowering
- Higher in the lower part of the plant

Nitrates in water

- Nitrates can be high:
- Ponds
- Shallow wells or streams that collect drainage from manure, highly fertilized fields or industrial waste
- Up to 100 ppm in water should be safe for cattle if forage is free of nitrates



Nitrate Detection

- Forage analysis
- Good sample (representative of the forage)
- Use of hay probe
- When testing indicate nitrate analysis




Nitrate results interpretation

- Levels are difficult to interpret due to inclusion rates in cattle diets
- Twice as much nitrate is necessary to kill cattle when nitrate is eaten in forage as opposed to when is consumed quickly as in a protein supplement or drench




Causes and symptoms of nitrate toxicity

- Most forages contain some nitrate
 - Nitrate is not particularly toxic to cattle
 - Nitrates get transformed into nitrites by ruminants
 - Nitrites are toxic and the cause of nitrite poisoning
- 



Symptoms of nitrate poisoning

- Nitrates are absorbed in blood
 - Nitrates transform hemoglobine into methemoglobuline which can not carry oxygen
 - Dilation of blood vessels
 - Peripheral circulation failure
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Signs of nitrate poisoning

- Difficult breathing
- Purple membranes
- Rapid breathing
- Muscle tremors
- Weakness
- Low tolerance to exercise
- Incoordination
- Diarrhea/increase urination



Nitrate poisoning

- Dark to chocolate blood
- Collapse
- Abortion
- Reduction of milk production

Nitrate poisoning treatment

- IV injection of methylene blue (4 mg per pound of body weight).
- Reduction of methemoglobine in blood.
- Dose to be repeated in 20-30 minutes if the initial response is not satisfactory.

Lead poisoning

- **Associated with seeding and harvesting activities.**
- **Lead enters the blood and soft tissues and bone causes cerebellar hemorrhage and edema associated with capillary damage.**
- **Lead is also irritating, immunosuppressive, gametotoxic, teratogenic, nephrotoxic, and toxic to the hematopoietic system.**

Lead Poisoning

- In cattle, signs that appear within 24-48 hr of exposure include
 - ataxia
 - blindness
 - salivation
 - spastic twitching of eyelids
 - jaw champing
 - muscle tremors
 - convulsions

Lead poisoning

- If tissue damage is extensive, particularly to the nervous system, treatment may not be successful.
- Treatment: Calcium disodium edetate (Ca-EDTA) is given IV or SC (110 mg/kg/day) Ca-EDTA is commercially available at present.
- Thiamine (2-4 mg/kg/day SC) alleviates clinical manifestations and reduces tissue deposition of lead. Combined Ca-EDTA and thiamine treatment appears to produce the most beneficial response.

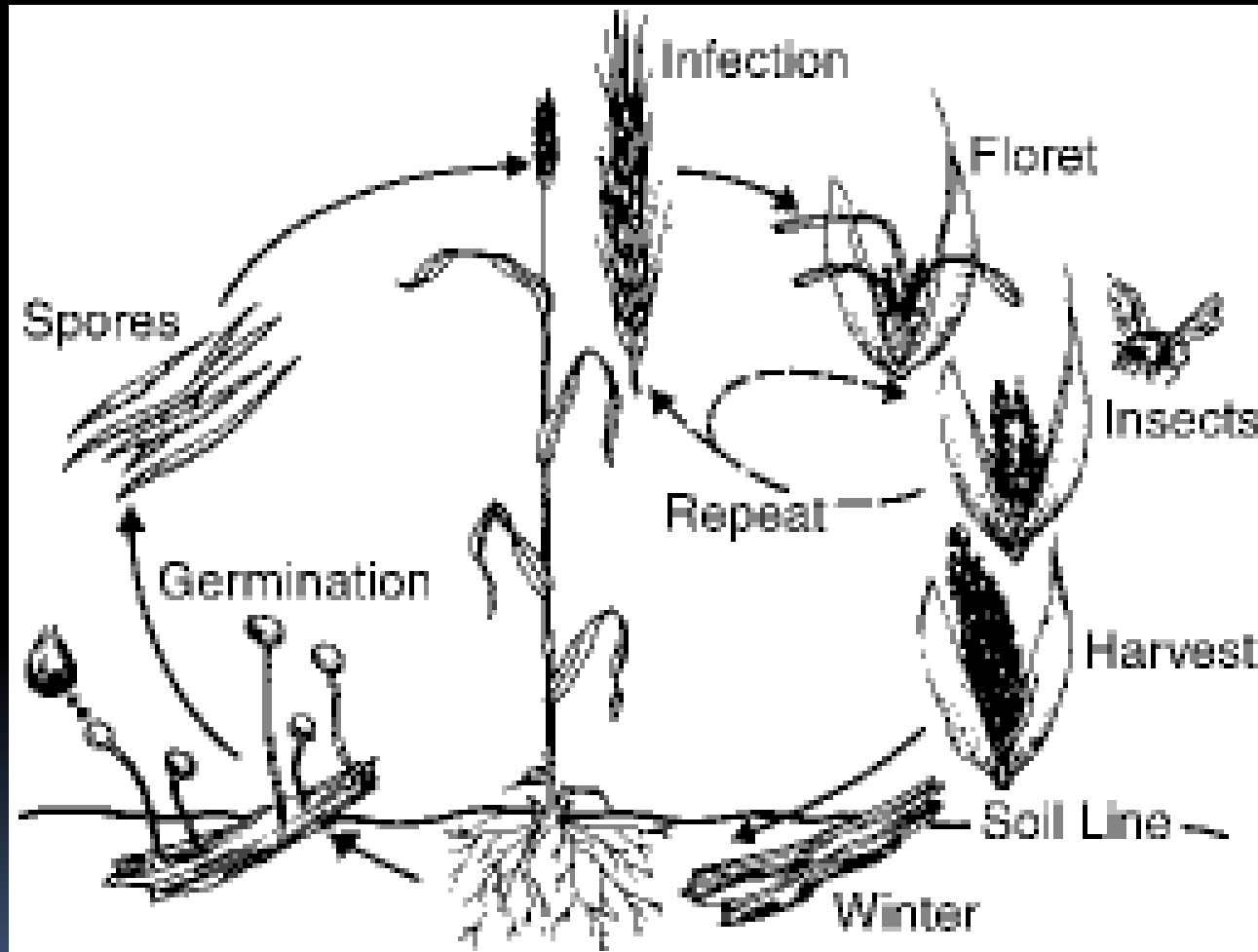
Ergotism

- This worldwide disease of farm animals results from continued ingestion of fungus *Claviceps purpurea*, which replaces the grain or seed of rye and other small grains or forage plants, such as the bromes, bluegrasses, and ryegrasses.
- Cattle may be affected by eating ergotized hay or grain or occasionally by grazing seeded pastures that are infested with ergot.
- Lameness, the first sign, may appear 2-6 wk or more.
- Body temperature and pulse and respiration rates are increased. Epidemic hyperthermia and hypersalivation may also occur in cattle poisoned with *C. purpurea*

Ergotism

- Associated with the lameness are swelling and tenderness of the fetlock joint and pastern.
- Identical signs and lesions of lameness, and sloughing of the hooves and tips of ears and tail, are seen in fescue foot in cattle grazing in winter on tall fescue grass infected with an endophyte fungus, in which the ergot alkaloid ergovaline is considered a major toxic principle.
- Ergotism can be controlled by an immediate change to an ergot-free diet.

Ergotism



Aflatoxicosis

- Aflatoxins are produced by toxigenic strains of *Aspergillus flavus* and *A. parasiticus* on peanuts, soybeans and other cereals .
- Usually, this means consistent day and night temperatures $>70^{\circ}\text{F}$.
- Dietary levels of aflatoxin (in ppb) generally tolerated are <100 in calves, and <300 in cattle. Dietary levels as low as 10-20 ppb may result in measurable metabolites of aflatoxin (aflatoxin M_1 and M_2) being excreted in milk; feedstuffs that contain aflatoxins should not be fed to dairy **COWS.**

Aflatoxicosis

- In acute outbreaks, deaths occur after a short period of inappetence.
- Subacute outbreaks are more usual, and unthriftiness, weakness, anorexia, and sudden deaths can occur. >1,000 ppb are associated with acute aflatoxicosis. Frequently, there is a high incidence of concurrent infectious disease, often respiratory, that responds poorly to the usual chemotherapy.
- Control: Contaminated feeds can be avoided by monitoring batches for aflatoxin content. Young, newly weaned, pregnant, and lactating animals require special protection from suspected toxic feeds. Dilution with noncontaminated feedstuff is one possibility.



POISONING BY PLANTS

Bracken fern poisoning

- **Anemia**
- **Can take 1-3 mo to develop.**
- **Both leaves and rhizomes contain the toxic principles, which vary in concentration with the season.**
- **Most acute poisonings are seen after periods of drought when grazing is scarce; however, the plant is toxic even when present as a contaminant in hay, and cases have occurred in stabled animals.**



Braken fern poisoning

- Effects in cattle
- Hemorrhagic syndrome
- Death.
- Affected cattle are weak
- Rapidly lose weight
- Fever, 106-110°F
- Difficulty breathing
- icteric or pale mucosae with petechiae.
- Clots of blood may be passed in the feces,
- Bleeding from body orifices



Bracken Fern poisoning

- **Animals should be removed from contaminated pasture.**
- **Difficult to convince farmers that the plant is poisonous because the disease can appear up to 2 wk after livestock are removed from the fern-infested area.**
- **Antibiotics may be useful to prevent secondary infections.**
- **Blood or even platelet transfusions from a donor not grazing bracken may be appropriate, but large volumes are required (minimum of 2-4 L blood).**

Abnormal leaf flower

- Toxic to cattle
- Toxic unknown
- Listlessness for several days
- Anorexia
- Ceaseless walking
- Periods of nonbelligerent charging about
- Diarrhea and occasional rectal prolapse
- photosensitization
- Treatment: Avoid consumption
Non-palatable plant material.



Bag-pod sesbania

- Bag-pod sesbania contains sesbaimide, which is concentrated in the seed.
- Fresh green plants are unpalatable; only the mature dry seedpods and seeds are consumed.
- Animals pastured with the plant during the growing season are seldom poisoned, but naïve ruminants, especially goats and cattle, are often poisoned when they are introduced to the dried plants in the fall and winter.



Bag-pod sesbania

- Livestock signs
- Signs of poisoning occur within 1 or 2 days after consumption and can include: depression, diarrhea, Weakness, Rapid heart rate, Labored breathing, and Death.
- Avoid placing hungry, naïve ruminants in pastures containing plants with mature seedpods. Fill newly introduced animals with hay before releasing them, and do not place them in heavily infested pastures without supplemental feed.
- Heavy infestations can be eliminated by mowing and prevented by good range management practices, as these plants are poor competitors.



Bermudagrass staggers

- Seen only in cattle
- the staggers syndrome may result from the consumption of the stable toxin of a fungus in hay or from pastures, usually in the fall.
- This grass contains unusually high levels of the amino acid tryptophan, which is converted by rumen microbes to the lung toxin 3-methyl indole.



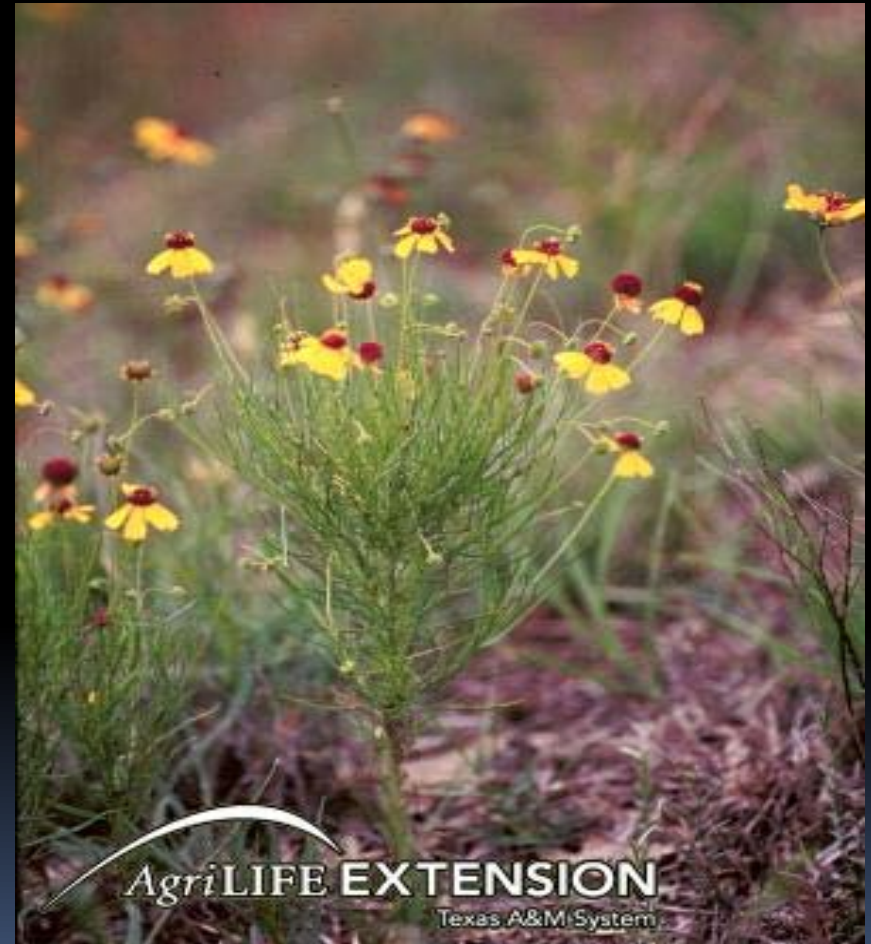
Bermudagrass staggers

- Clinica signs:
- head bob, muscle tremors, incoordination, collapse when forced to make rapid movement, inability to regain feet, worsened conditioned if the animal is assisted.
- The staggers syndrome is reversible, and most cattle recover unless there is a fatal accident.
- Remove cattle with staggers from the toxic hay or pasture, supply them with feed and water and allow them to remain as quiet as possible. Complete recovery may take up to 3 weeks.



Bitter sneezeweed

- A sesquiterpene lactone
- Greatest at time of flowering.
- This bitter plant is seldom consumed at a level high enough to produce clinical signs. However, it has been responsible for bitter, undrinkable milk and is suspected to be the cause of unpalatable meat from calves slaughtered off the range. The toxin is stable in plants contaminating hay.
- Signs of bitter sneezeweed poisoning include: Weakness; Incoordination; vomiting; salivation; diarrhea; grinding



Bitter sneezeweed

- Avoid cutting hay containing a large amount of bitter sneezeweed.
- Do not feed hay containing any of the plant to lactating dairy cows. Do not slaughter grass-fed cattle from a pasture that contains bitter sneezeweed.
- Severe infestations may be controlled with broadleaf herbicides such as 2,4-D or Grazon P+D® at 0.5 to 1.0 pound a.i./acre in the spring with good growing conditions.



Black locust

- The toxic agent of black locust is robin, a protein toxin. All parts of the plant except the flower are toxic.
- Signs of poisoning are anorexia; depression; diarrhea; Weakness (posterior paralysis in cattle and horses); cold extremities; weak pulse; Irregular heartbeat.
- In fatal cases, death usually occurs within 1 or 2 days.
- Most clinically affected animals recover after removal from the source.



Caroline horse nettle

- Horse nettle glycoalkaloids.
- More toxins are present in the fruits than in the leaves.
- The signs may include:
Anorexia; Depression; Excess salivation; Diarrhea or constipation; Trembling; Weakness; Colic.
- Avoid including the mature plants in hay, silage or green chop.
- Apply 0.6 to 0.9 pound a.i./acre of Grazon P+D® as a broadcast treatment or a 1 percent solution as an individual plant treatment when plants begin to flower in the spring.



Buttercup

- Toxic: glycoside, a blistering agent.
- increases greatly as the plants mature and reach the flowering stage.
- The plant is not a problem in hay.
- The signs of poisoning are those of severe gastrointestinal irritation and include: Red and/or ulcerated oral tissues; Salivation; Blood-tinged milk; Diarrhea; Abdominal pain; Depression or excitation; Convulsions; Death.
- Most cases of buttercup poisoning in Texas are not life threatening.
- Poisoning can usually be prevented by not forcing animals to consume buttercup at flowering.
- Some pastures must be vacated to prevent diarrhea. These may be used for hay if enough forage such as ryegrass is mixed with the buttercup.



Butterweed

- Pyrrolizidine alkaloids cause liver cirrhosis.
- Anorexia; Depression; Weight loss; Aggression; Death.
- Sheep are more resistant to pyrrolizidine alkaloid poisoning and may be used to “clean” the pastures while the plants are young.
- Severe infestations may be controlled with broadleaf herbicides such as 2,4-D or Grazon P+D® at 0.5 to 1.0 pound a.i./acre in the spring with good growing conditions.



Dallisgrass Ergot

- Mycotoxins responsible for dallisgrass staggers
- Cattle eat mature seed heads in the pasture (calves)
- Hyperexcitability; Uncontrollable muscular tremors; Incoordination; Falling when forced to exercise; Inability to regain feet.
- Cattle usually recover when they are removed from ergotized pastures



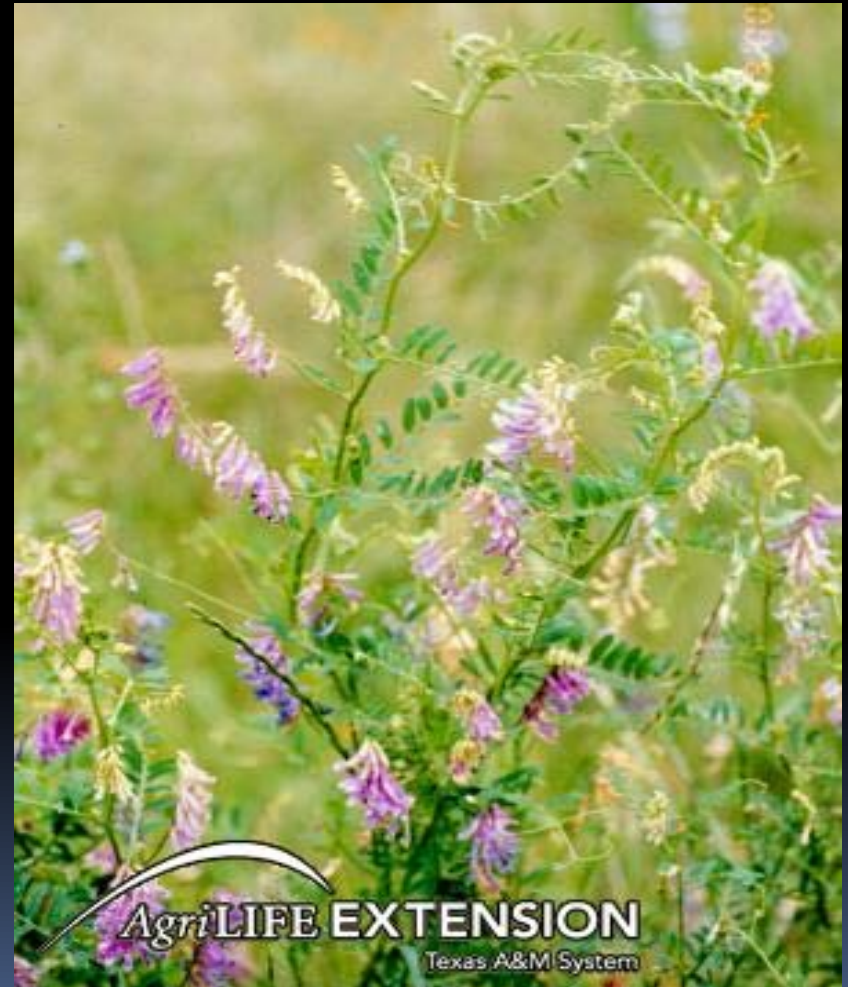
Carelessweed, pigweed

- Nitrates
- Plants containing more than 1 percent nitrate are dangerous. The plant is also known to cause bloat
- Keep livestock off heavily infested pastures during early stages of plant growth and after sudden temperature changes.
- This plant remains dangerous in hay or silage.
- Livestock are most often poisoned when they are placed in a pen containing many carelessweed plants, focus herbicide or mechanical treatments on these areas.



hairy vetch

- Poisoning invariably involves animals with black pigmented skin.
- Clinical signs may include: Inflamed skin (head, neck and tailhead); Thickening of skin with granular tumors; Matting of hair and sloughing of skin; Diarrhea; Anorexia; Loss of weight; Death.
- Death from kidney failure.
- Hairy vetch is a desirable, nutritious forage and should continue to be used as such. However, cattle grazing vetch should be observed frequently.



Johnsongrass

- Cyanogenic glycosides, which are converted to free cyanide in the rumen.
- Cyanide may be present in freshly frosted plants, nitrates after fertilization and during drought.
- Cyanide is fast. Signs of illness may begin within 5 minutes after consumption. Death may occur within 15 minutes or several hours.
- Clinical signs generally occur in this order: Salivation and labored breathing; Muscle tremors; Incoordination; Bright red venous blood; Convulsions; Death.



Johnsongrass

- Treat livestock showing signs typical of cyanide poisoning with sodium nitrite and sodium thiosulfate. If nitrate poisoning is the problem, treat with methylene blue.



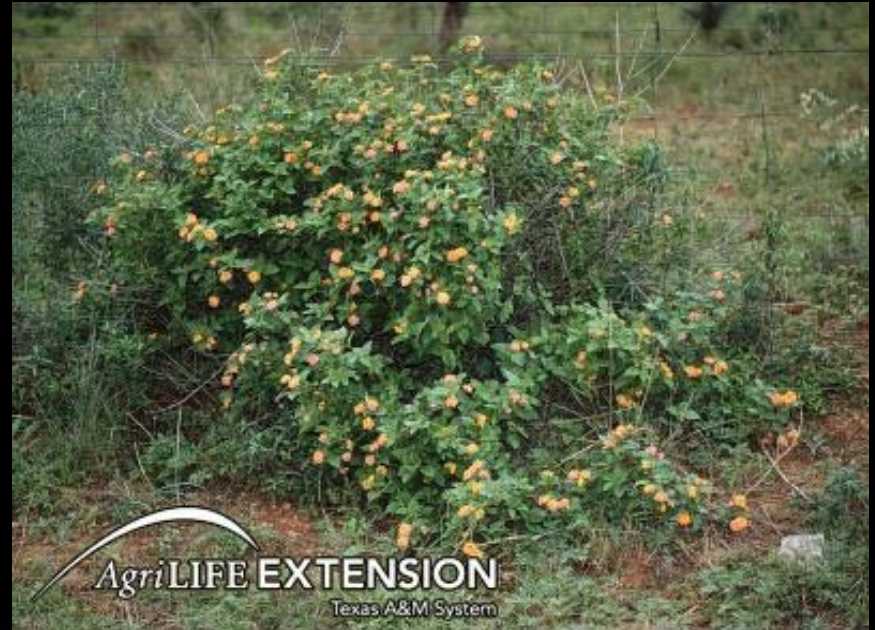
Sweet clover

- Coumarin the toxin dicoumarol by bacteria or fungi.
- Signs can appear suddenly or after several months and include: Stiffness and lameness; Soft swelling under the skin; Nosebleeds; Anemia; Convulsions; Sudden death.
- Forage containing sweetclover should be baled only in small square bales after it is well-cured, and should not be fed moldy. Treat poisoned animals with vitamin K and eliminate sweetclover from their diet.



Largeleaf lantana

- Lantadene A and B from largeleaf lantana are responsible for the toxicity of the plant
- Very high doses result in widespread liver necrosis or death of liver cells.
- Sluggishness; Weakness; Bloody diarrhea; Jaundice (yellow whites of the eyes, yellow skin; yellow fat and liver after death); Secondary photosensitization.
- Allow poisoned animals to remain in the shade and give them sun-bleached hay, feed



Lambert crazyweed, locoweed

- The toxic agent is damage to the brain, liver, digestive organs, placenta, ovaries and testes.
- Damage is reversible except in the brain.
- Carrying the head a little lower than normal; Vacant stare; Trembling of the head; Difficulty or inability to eat and drink; Infertility or subfertility in males and females; Abortion, or deformed or weak offspring.
- Native animals generally avoid locoweed when good quality forage is available.
- Individuals observed eating loco should be removed to a locoweed- free pasture. Grazon P+D® can be applied to individual plants.





Cattle poisoning overview

- The presentation will be available online at:
- [http://hopkins-tx.tamu.edu/publications/agricultural and natural resources/cattle poisoning Winnsboro 2010.](http://hopkins-tx.tamu.edu/publications/agricultural%20and%20natural%20resources/cattle%20poisoning%20Winnsboro%202010)