

Plant	Clinical Signs	Toxic Agent	Treatment Recommendations for Cattle
<i>Distribution maps can be found in the Plants database: http://www.plants.usda.gov</i>			
Perilla Mint (<i>Perilla frutescens</i>)	Ingestion of perilla mint causes "acute respiratory distress syndrome", a sudden and dramatic onset of open-mouth breathing with the head and neck extended, nostrils dilated, a sway-back appearance, tongue protruding with foam coming from the mouth, an open-shouldered stance, and sometimes aggression. Breathing is shallow and rapid. Affected animals are frequently found dead. Mature cattle are most often affected but it can occur in yearlings and calves.	The flowering or seed parts of perilla mint contain the highest concentration of perilla ketone, considered the most toxic agent involved. The early pre-seed stage of the weed is of relatively low toxicity while the flowering and green seed stage plant is most toxic, especially the seeds themselves. Dried hay is less of a risk than green plants but still can be lethal while frosted plants have relatively low toxicity. The perilla ketone is absorbed into the bloodstream and carried to the lungs where it damages the lung tissue.	Severely affected animals usually die quickly but animals that live 48 hours typically survive although may develop chronic lung problems or heart failure. The stress of handling cattle can cause prompt death so treatment, if attempted, must be handled very cautiously. A dart gun may be necessary to avoid moving the animal to a treatment facility. Treatments administered or recommended by a veterinarian may include diuretics, nonsteroidal anti-inflammatory medications and corticosteroids used in an extra-label manner. Treatment is of limited value and severe cases seldom survive.
Johnsongrass (<i>Sorghum halepense</i>)	Sudden death. Increased respiratory rate, anxiety, trembling, muscle twitching, collapse, convulsion, death in minutes. Blood has a bright cherry red color. The signs of nitrate intoxication occur quickly and may be fatal within minutes to hours. Weakness, staggering, aggressive behavior, foamy salivation, and dark mucous membranes may be observed prior to death. Blood has a brown to chocolate color. Those pregnant cows that survive will likely abort.	Cyanogenic glycosides. When plant cells are crushed, chewed, wilted, frozen, chopped or otherwise ruptured, the enzymes in the plant can rapidly form free cyanide gas which is rapidly absorbed in the bloodstream from the rumen. Immature, < 2 feet tall, drought stressed, physically damaged, or frost damaged johnsongrass are forms at highest risk for poisoning. Cyanide prevents hemoglobin from releasing oxygen to tissues and the animal dies quickly from lack of oxygen. Johnsongrass may also be a nitrate accumulator under certain conditions. Nitrates are highest in the stems and lowest in the leaves and seeds. Excess nitrates result in formation of methemoglobin from hemoglobin in the blood, a form which cannot transport oxygen.	Sodium thiosulfate at 660mg/kg slowly IV as a 30% solution for cyanide toxicosis. For nitrate toxicity, treatemnt with Methylene Blue (1% solution) at a dose of 4-15mg/kg slowly by IV injection
Poison Hemlock (<i>Conium maculatum</i>)	Foliage has an unpleasant mouse urine-like odor, detectable when near the plant or when a stem or leaf is crushed. Livestock generally avoid it unless forage is scarce but it may be accidentally consumed as a contaminant of hay or silage. Symptoms of poisoning can occur rapidly anywhere within 30 minutes to 2 hours depending on the animal, quantity consumed, and toxicity depending on stage of plant growth. Signs include muscle weakness, incoordination, trembling, dilated pupils, salivation, weak heartbeat, mousy odor to breath and urine, death by paralysis of respiratory muscles	Contains 8 piperidine alkaloids; the two major ones are coniine (major alkaloid in the seed) and gamma-coniceine (predominate in green, vegetative growth). There is considerable variation in the toxic alkaloid content of the plant depending on stage of growth, season, moisture, temperature, time of day, and geographical region. The conium alkaloids have two major effects: 1) rapid, sometimes fatal effects on the nervous system by acting as neuromuscular blocking agents and 2) they are teratogenic agents (causing birth defects in calves and pigs) if eaten during the first trimester of pregnancy. Cattle have died by eating as little as 0.2-0.5% of their body weight in green hemlock. Hay and grain contaminated with seeds are sources of poisoning.	No specific treatment for poisoning exists. If acute poisoning does not progress to respiratory failure and death, the prognosis for full recovery is good. Avoid overexcitement and stress that may exacerbate clinical signs and result in death.
White Snakeroot (<i>Ageratina altissima</i> formerly known as <i>Eupatorium rugosum</i>)	Causes "trembles" in cattle due to acidosis and ketonemia resulting from hypoglycemia. Gradual onset of depression, weakness, reluctance to move, muscle tremors, stiffness, constipation, acetone odor to breath, and collapse. Signs may be in calf and not in the dam.	Tremetol was originally associated with toxic effects but it is actually a mixture of compounds that make up tremetol that cause metabolic impairment. Consumption of green plant material at 5-10% of body weight is needed, either in small amounts over several weeks or large amounts over several days. Leaves, stems, green flower heads. Toxicity decreases with drying but still possible in hay. Cows can excrete tremetol in milk, protecting the cow but places calves and humans at risk.	Treatment involves good nursing care along with high quality feed, IV glucose to alleviate ketosis and acidosis, and activated charcoal to reduce absorption of toxin. Prolonged period of recovery.
Solanaceae (Nightshade family)	Horsenettle, Jimsonweed, also black nightshade (<i>Solanum nigrum</i>), potatoes (<i>Solanum tuberosum</i>). Potatoes are toxic if sprouted and skins turn green. Green tomato vines may cause poisoning if fed to livestock.		
Horsenettle/ Bullnettle (<i>Solanum carolinense</i>)	Depression, loss of appetite, drowsiness, incoordination, trembling, weakness, grinding teeth, rapid breathing, constipation but followed by diarrhea. Calves may have edema (swelling), ventral subcutaneous swelling, and abdominal fluid accumulation.	Toxin is primarily solanine, a tropane alkaloid, causing decreased intestinal motility, dilated pupils, fast heart rate and irritant effects in the digestive system. May have additional cardiac (heart), neurologic and hepatic (liver) effects.	Alleviation of clinical signs, possibly with physostigmine, to treat anticholinergic poisoning
Jimsonweed (<i>Datura stramonium</i>)	Generally not a problem because is unpalatable. Consumption of small amounts cause reduced gut motility and decreased appetite. Dilated pupils, dry mucous membranes, and increased heart and respiratory rate. Depression, restlessness, irritability, constipation; if severe intoxication, ataxia and delirium, respiratory failure	Anticholinergic tropane alkaloids hyoscyamine and scopolamine. Entire plant, both green and dried in hay. Seed most toxic. Contamination with 1000 seeds /kg feed is cause for concern in adult cattle	Activated charcoal given orally. Physostigmine is drug of choice for reversing anticholinergics.

Cocklebur (<i>Xanthium strumarium</i>, <i>X. pensylvanicum</i> and other spp.) Primarily a Liver Toxin	Potent disruptor of cellular function leading to profound hypoglycemia, brain and liver tissue primarily affected. Excess salivation, tremors, ataxia (wobbly gait), seizures, , sometimes regurgitation and aggression may be seen.Rapid progression to death. Hepatotoxicity (liver damage) is a common finding but does not always cause death.	Carboxyatractyloside (CAT) is responsible for toxic effects, which is concentrated in embryonic and cotyledonary tissues so it is found only in seeds within the bur and the 2-leaf seedling stage. 2 leaf stage is lethal to calves at 1% of body weight. Seeds toxic and potential problem in hay, silage or grain. A dose of 0.14-0.2% body weight of seeds is toxic in calves.	No treatment to counteract effects. Activated charcoal and IV glucose may help but prognosis is poor.
Plants Primarily Affecting the Renal System (Kidneys)	Oxalates consumed at a toxic level produce signs of muscle tremors, weakness, tetany and recumbency, usually due to low blood calcium and magnesium from the kidney damage. Death is attributed to kidney failure.		
Spiny Amaranth/ Pigweeds (<i>Amaranthus spinosus</i>, <i>A. retroflexus</i> and other spp)	After ingestion over several (5-10) days, signs of renal (kidney) disease develop including weakness, trembling, unsteadiness, knuckling, paralysis and death within 1-2 days. May see diarrhea with or without blood. The signs of nitrate intoxication occur quickly and may be fatal within minutes to hours. Weakness, staggering, aggressive behavior , foamy salivation, and dark mucous membranes may be observed prior to death. Those pregnant cows that survive will likely abort.	Appearance of the renal form of disease is with ingestion of fresh green plants. Some animals seem predisposed to seek out the weed and consume it. The cause of myocardial degeneration (heart muscle damage) and renal (kidney) disease are not known. Oxalates are suspected of causing the renal effects but other factors likely contribute. Oxalate levels are highest in leaves, lowest in stems and moderate in the seeds. Nitrate poisoning may be seen with fresh plant material but more likely in dried plants in hay. Nitrates are highest in the stems and lowest in the leaves and seeds. These weeds are predisposed to accumulate nitrates under certain conditions (heavy fertilization/ spray with 2,4 D). Excess nitrates result in formation of methemoglobin from hemoglobin in the blood, a form which cannot transport oxygen.	Renal form of the disease, goal of treatment is to allow recovery of function of the kidneys through general nursing care. Treatment with calcium is not useful.Prognosis for recovery is poor. Treatment for nitrate intoxication is 4-15 mg/kg body weight of a 1-2% solution of methylene blue IV. Extended withdrawal time of 2 years is necessary.
Curly Dock (<i>Rumex crispus</i>)	Abrupt onset (8-12 hours after beginning to graze new pasture), signs of depression, excess salivation, staggering gait, tremors, difficulty walking, collapse, labored breathing, death if left untreated.	Rare intoxication. Oxalate toxicosis and digestive tract irritation. Seldom a problem because plants are not eaten or eaten slowly due to bad taste.	Prompt treatment with calcium solutions will result in relief of symptoms. Relapses may occur.
Plants Affecting the Cardiovascular System	Plants affecting the cardiovascular system contain cardiac glycosides that cause heart and digestive disturbances. Heart problems include irregular heart rhythms and eventual heart block; digestive problems include abdominal pain and diarrhea.		
Hemp Dogbane (<i>Apocynum cannabinum</i>)	Diarrhea, sometimes with blood, weakness, slow heart rate. Very large amount required for intoxication of cattle	All plant parts, green or dried in hay, contain cardenolides which are toxic to the heart (cardiotoxic). Effects are similar to digitalis and may inhibit heart function. Also digestive disturbances.	Activated charcoal and other symptomatic treatment.
Milkweed (<i>Asclepias syriaca</i> and other spp.)	Signs develop within 8-10 hours with severity depending on amount consumed. Toxic effects include a fast heart rate, incoordination, weakness, trembling, muscle twitching, falling, seizures, paddling, bloat, groaning, salivation, respiratory failure and death.	Contain toxic cardenolides (cardiac glycosides) that affect the heart by affecting heart muscle conduction and contractility. Other glycosides and resinoids have direct effects on the nervous system. Milkweeds are most toxic during rapid growth and retain their toxicity when dried in hay. All parts of plant, consumed green or dried in hay, are toxic. Depending on the type of milkweed, 0.5-2% of animal's body weight in green plant can cause symptoms.	No specific treatment is available. Animals that do not consume a lethal dose should recover over several days but may be very weak during recovery. Activated charcoal along with sedatives to control convulsions may help. Atropine is indicated for cardiotoxic effects.
Plants Affecting the Digestive System	Excess Salivation (drooling, slobbering), and diarrhea are common signs		
Buttercup (<i>Ranunculus abortivus</i> and other spp)	Blistering of the skin, mouth and digestive system. Irritation to mucous membranes of mouth and digestive system. Excess salivation (drooling, frothy saliva) and intestinal irritation that may result in gastroenteritis and diarrhea. Bitter taste can be passed in the milk.	Oily glycoside ranunculin converted to irritant protoanemonin by plant enzymes when plant is chewed. Stems and leaves; Plants are particularly irritating when flowering. Hay is safe.	Intestinal protectants such as mineral oil are beneficial.
Pokeweed/ Pokeberry (<i>Phytolacca americana</i>)	Oral irritation, excessive salivation, irritation of digestive tract, moderate to severe gastroenteritis, diarrhea (may be bloody), depression, death possible depending on amount consumed	All plant parts, esp. roots and seeds (berries), contain irritant saponins, oxalates and the alkaloid phytolacine. Dairy cattle fed pokeweed in green chop developed severe diarrhea, drop in milk, and decreased body temperature the following day	Intestinal protectants (activated charcoal) to control absorption of toxins, fluids to correct dehydration and electrolytes