



TOXICOLOGY



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What clinical signs are associated with toxicity due to ingestion of the plant in this image?

[Click here to see image](#)

Convulsions, dyspnea, teratogenic effects in newborns (arthrogryposis)	HIDE
Bright red mucous membranes, tachycardia, rapid respiration, collapse, death	HIDE
Gastric ulcers, colic, hematochezia	HIDE
Posterior incoordination with urinary incontinence and cystitis, abortions	HIDE
Hemorrhages, hematuria, methemoglobinemia, cyanosis, subnormal temperature	HIDE

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THE MERCK VETERINARY MANUAL Multimedia

LOCATION(S) • Range Plants of Temperate North America

 **Lupinus sericeus (Lupine)**

photo size: [small](#) | [high](#)



Lupinus sericeus (Lupine).

Courtesy of Dr. Lynn James



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What clir

Posterior

Convuls

Gastric

Hemorrhages, hematuria, methemoglobinemia, cyanosis, subnormal temperature

Bright red mucous membranes, tachycardia, rapid respiration, collapse, death

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Convulsions, dyspnea, teratogenic effects in newborns (arthrogryposis)

Correct:

The most common toxic cause of arthrogryposis in the calf or lamb is consumption of quinozolidine alkaloids in *Lupine* spp. plants by pregnant dams.

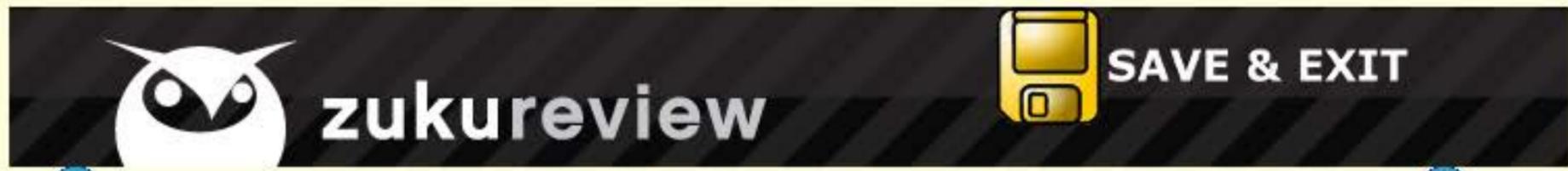
Adults that eat lupine may display inappetence, dyspnea, convulsions or death from respiratory paralysis.

If lupines become infected with a fungus (*Phomopsis leptostromiformis*), mycotoxic lupinosis can cause hepatic damage.

Click here to see a [Table of toxic range plants in North America](#).

Refs: Pasquini's Guide to Bov Clin, 4th ed. pp. 220, **241** and the Merck Veterinary





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Which one of the following plants can cause the problem seen in the following image?

[Click here to see image](#)

<i>Senecio spp., Crotalaria spp., Amsinckia spp.</i>	HIDE
<i>Amaranthus spp., Chenopodium spp.</i>	HIDE
Bracken fern, <i>Equisetum spp.</i>	HIDE
Moldy sweet clover	HIDE
Soybeans	HIDE

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LOCATION(S) • Non-Neoplastic Enlargement of the Thyroid Gland

Enlarged thyroid, foal

photo size: small | [high](#)



Non-neoplastic enlargement of the thyroid gland (goiter), foal.

Courtesy of Dr. Thomas Lane.



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1

Correct:

Goitrogenic plants include soybeans, cabbage, rape, kale, and turnips.

Which of

Foals can be born with hyperplastic goiter and hypothyroidism to dams who eat those plants (especially soybeans), or who are being fed either excessive or inadequate iodine.

Click here

Senecio spp, Crotalaria spp., and Amsinckia spp. all contain pyrrolizidine alkaloids (think liver damage).

- Senecio
- Amaran
- Bracken

Refs: Smith, Large Animal Internal Medicine, 4th ed. p. 1351 and the Merck Veterinary Manual online edition.

Moldy sweet clover

Soybeans HIDE

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A **necropsy** is performed on a **horse** that **died suddenly** in the night, after getting into a **bin** of **cattle feed**.

The necropsy reveals pale **myocardium, epicardial hemorrhage and some rhabdomyolysis**.

What condition is suspected of killing this horse?

Selenium toxicity	HIDE
Non-protein nitrogen toxicity	HIDE
Hyperkalemic paralysis	HIDE
Cantharidin toxicity	HIDE
Ionophore toxicity	HIDE

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Correct: Ionophore toxicity

Think MUSCLE DAMAGE (rhabdomyolysis and cardiomyopathies) with ionophore toxicity (e.g.: Monensin®, Lasalocid®). Look for pale myocardium, hemopericardium, epicardial hemorrhages. In cattle may see ascites, hydrothorax, pulmonary edema.

Think more of an ulcerating gastritis/colic with cantharidin toxicity. Follow these links to see a typical blister beetle (*Epicauta* spp.) and a hemorrhagic gastritis.

There are no characteristic lesions with non-protein nitrogen toxicity (NPN, urea toxicity), but this is typically a ruminant disease. Animals may show CNS signs/convulsions before death. May see non-specific pulmonary edema, congestion and petechial hemorrhages. Carcasses appear to bloat, decompose quickly.

Look for lung edema, congestion, and multiple organ necrosis (liver, lung, kidney) with selenium toxicosis.

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Seleniur

Non-pro

Hyperkalemic paralysis	HIDE
Cantharidin toxicity	HIDE
Ionophore toxicity	HIDE

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Epicauta temexia (striped blister beetle).





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A **Holstein heifer** was normal in the morning and **found dead at noon**. Several others are lethargic and have bloody diarrhea. These are dairy replacement heifer calves, 4 to 8 months of age, and 200 to 400 lbs of body weight.

The **animals** were **vaccinated** at 30, 60, and 90 days of age for bovine viral diarrhea virus, IBR, and *Clostridium* species (8 way). **The diet is alfalfa hay** and a calf ration of mixed concentrates and supplements. **No change in feed** or housing has occurred.

Rectal temperatures and respiratory rates are **normal**; pulse rates ranged between 40 and 140 beats per minute. Cardiac arrhythmias were noted on auscultation in 2 animals.

Blood work showed **increased plasma creatine kinase** in 3 of 4 calves.

Fecal analysis – culture negative, 100 coccidia per gram feces, **no abomasal parasites**.

Photographs from the pasture are shown below. Which one of the following choices is the most likely **diagnosis?**



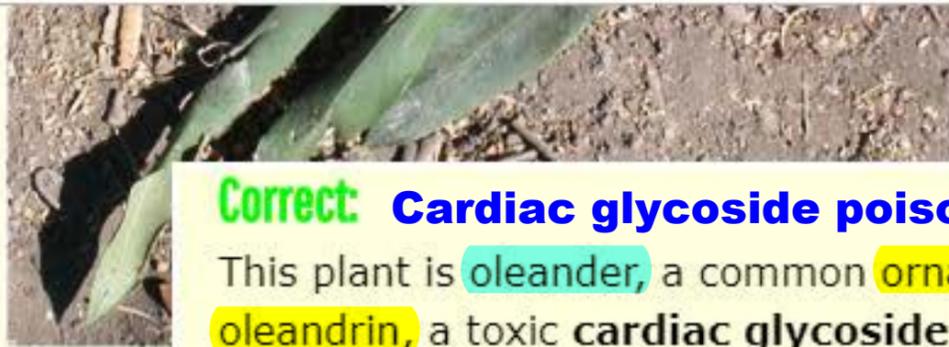




Cardiac glycoside poisoning	HIDE
Cyanide poisoning	HIDE
Pyrrrolizidine alkaloid poisoning	HIDE
Quercus poisoning	HIDE
Hemlock poisoning	HIDE

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Correct: Cardiac glycoside poisoning

This plant is **oleander**, a common **ornamental plant**. All parts of the plant contain **oleandrin**, a toxic **cardiac glycoside**.

Cardiac

These calves were positive for oleandrin; oleander leaves were found in the rumen of the dead calf. The entire group was treated orally with activated charcoal, but 2 more calves died.

Cyanide

Pyrrolizi

Cardiac glycosides **affect sodium channels in cardiac and skeletal muscles**.

Quercus

These heifers were poisoned when a neighbor's children cut the oleander and fed it to them.

Hemlock

The presence of **coccidia** in stool is common, and **should not be treated unless** the **count is greater than 5000 eggs per gram**.

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A 3-year-old intact beagle presents on emergency at 5 pm. The owner saw the dog licking up antifreeze spilled while he was flushing the radiator in his car this morning.

After supper, the dog began to vomit, and then had a seizure. The dog is markedly obtunded on physical exam.

The owner feels responsible and wants to do whatever is necessary to help the dog, but would prefer the shortest effective treatment course, if possible.

What is the treatment of choice?

Value	Normal
T=100°F (38°C)	99.5-102.5°F, 37.2-39.2°C
HR=120 bpm	60-120
RR=40 brpm	15-34

Methanol 20%	HIDE
Imidocarb dipropinate	HIDE
Pralidoxime chloride (2-PAM)	HIDE
Calcium EDTA	HIDE
4-methylpyrazole	HIDE

obtunded on physical exam.

The owner feels responsible and wants to do whatever is necessary to help the dog, but would pr

What is t **Correct: 4-methylpyrazole**

When the shortest effective treatment course is desirable, 4-methylpyrazole is the treatment of choice for ethylene glycol toxicity.

T=100%
HR=1
RR=4

Ethanol is effective and not wrong per se, but it is not among the choices, and the treatment protocol for ethanol requires a longer stay in intensive care than 4-methylpyrazole (fomepizole, 4-MP).

Methanol (wood alcohol) is toxic to animals, most commonly found in windshield washer fluid, where it acts as antifreeze. Blindness can occur in people who drink methanol.

Imidoca
Pralidox
Calcium

Refs: The Merck Veterinary Manual online edition.

Methanol 20%	HIDE
4-methylpyrazole	HIDE

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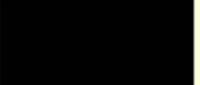
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Which **drug** is primarily **associated with teratogenicity** as an adverse effect?

Griseofulvin	HIDE
Acyclovir	HIDE
Clorsulon	HIDE
Levamisole	HIDE
Erythromycin	HIDE

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Which dr

Griseofu

Acyclovi

Clorsulo

Levamis

Erythron

Correct:

Griseofulvin is an known TERATOGEN, contraindicated in PREGNANCY, especially in cats and horses. Think also of ketoconazole and doxorubicin as teratogens.

In fact, almost every drug in Plumb's will either carry a warning that it may be fetotoxic at high enough of a dose, or that "not enough is known," or "use in pregnant animals only if benefits outweigh the risks," or "animal studies have not shown adverse effects on the fetus BUT use with caution in pregnant" etc.

Bottom line: most drugs must be used with caution, if at all, in pregnancy.

Griseofulvin can also cause bone marrow suppression if used long term (similar to chloramphenicol and sulfonamides like trimethoprim-sulfa (TMS)).

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Three 9-month-old heifers are presented with a 3-day history of severe gastroenteritis characterized by colic and diarrhea. The heifers are depressed, anorexic, weak, dehydrated and look shocky. Icteric mucous membranes and dark brown urine are observed.

A necropsy on one heifer that was found dead this morning finds erosions and ulcerations in the abomasum and an enlarged spleen. Tissues are discolored by icterus and the kidneys appear swollen and gun-metal in color. The urine is port-wine-colored.

What is the diagnosis?

Arsenic toxicity	HIDE
Molybdenum deficiency	HIDE
Lead poisoning	HIDE
Copper toxicity	HIDE
Selenium deficiency	HIDE

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Three 9-month-old heifers are presented with a 3-day history of severe gastroenteritis characterized by colic and diarrhea. The heifers are depressed, anorexic, weak, dehydrated and look

Correct: Copper toxicity

A necropsy of the heifers reveals **gun-metal grey kidneys and port-wine colored urine**. The above signs and symptoms appear to be consistent with **copper toxicity!** and "hemolytic crisis!" in a very loud voice. Look for a severe gastroenteritis, icterus, depression, weakness, shock.

What is the most likely cause? **Selenium deficiency** is associated with **white muscle disease**: Look for sudden death in a young calf.

Lead poisoning can produce severe GI signs, including a **hemorrhagic diarrhea**, but not the gunmetal kidneys or hemolytic signs. Cattle find arsenic on pesticide-contaminated foliage. Pets find arsenic in ant baits and in pressure treated wood (like on backyard decks) or wood preservative.

Arsenic **Lead poisoning** causes more **CNS signs** (encephalopathy, blindness), diarrhea, or constipation.

Molybdenum

- Lead poisoning
- Selenium deficiency
- Copper toxicity**
- Arsenic
- Molybdenum

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Foals with hyperplastic goiter can be born to mares fed improper levels of which choice?

Manganese	HIDE
Iron	HIDE
Copper	HIDE
Magnesium	HIDE
Iodine	HIDE

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Correct: Iodine

Foals can be born with hyperplastic goiter and hypothyroidism to dams being fed either excessive or inadequate iodine or goitrogenic plants such as soybean, cabbage, rape, kale and turnips.

- Mangan
- Iron
- Copper
- Magnesi
- Iodine**

Foals are born with visible goiters, weakness, hypothermia, and developmental abnormalities of the musculoskeletal system.

Refs: Smith, Large Animal Internal Medicine, 4th ed., p. 1351 and the Merck Veterinary Manual online edition.

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Veratrum spp. (false hellebore, skunk cabbage) ingestion is classically associated with which one of the following congenital defects in sheep?

Cyclopia	HIDE
Arthrogryposis	HIDE
Hydroencephaly	HIDE
Enamel dysplasia	HIDE
Cerebellar abiotrophy	HIDE

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- 1 ✓
- Veratrum one of the
- Cyclopia
- Arthrogi
- Hydroer
- Enamel

Correct:

Cyclopia in lambs is associated with ingestion of *Veratrum* spp. (false hellebore, skunk cabbage) by the dam early in gestation. The toxic agents of *Veratrum* spp. are steroidal alkaloids.

Ingestion by ewes on day 14 of gestation will produce cyclopean lambs. Ingestion on days 19-21 results in embryonic death; days 28-32 result in defects of the limbs.

Birth defects are most commonly seen in sheep, but cattle, goats, llamas, and horses are all susceptible.

[Click here](#) to see an image of *Veratrum* spp. (false hellebore, skunk cabbage).

[Click Here](#) to see the Merck Table of Poisonous Range Plants of Temperate North America.

Cerebellar abiotrophy HIDE

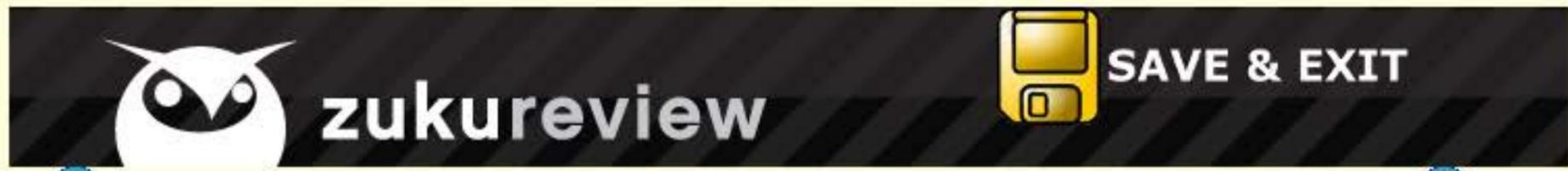
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Courtesy of Dr. Lynn James

Veratrum californicum (False hellebore).



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A newborn calf is presented with joints fixed in abnormal positions, kyphosis and a cleft palate.

[Click here to see image](#)

Which exposure during pregnancy for the cow may have caused this problem in-utero in the calf?

Metaldehyde	HIDE
<i>Brucella abortus</i> infection	HIDE
Sorghum (Sudan grass, Johnson grass, Milo)	HIDE
<i>Lupine spp</i>	HIDE
Gossypol	HIDE

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THE MERCK VETERINARY MANUAL Multimedia

LOCATION(S) • Congenital and Inherited Anomalies of the Musculoskeletal System in Cattle

Arthrogryposis, calf

photo size: [small](#) | [high](#)



Arthrogryposis in a calf.

Courtesy of Dr. Sameeh M. Abutarbush.

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A newborn calf has a cleft palate.

Click here to see a video of a newborn calf with a cleft palate.

Which of the following is the most common toxic cause of arthrogryposis in the calf or lamb?

- Metaldene
- Brucella
- Sorghum
- Lupine spp

Correct: Lupine spp

Newborn calves with arthrogryposis ("crooked calf") have ankylosed, rigid limbs, scoliosis, kyphosis, and sometimes a cleft palate.

The most common toxic cause of arthrogryposis in the calf or lamb is consumption of toxic alkaloids (anagyrine) in *Lupine spp* plants by pregnant dams. Click here to see a Lupine plant.

Adults that eat lupine may display inappetence, dyspnea, convulsions or death from respiratory paralysis. If lupines become infected with a fungus (*Phomopsis leptostromiformis*), mycotoxic lupinosis can cause hepatic damage.

Infectious causes of congenital arthrogryposis include in-utero infection with Bluetongue virus or Akabane virus.

Gossypol HIDE

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respiratory paralysis. If lupines become infected with a fungus (*Phomopsis leptostromiformis*), [mycotoxic lupinosis](#) can cause hepatic damage.

A newborn calf has a weak suckling reflex and a depressed appetite. Infectious causes of congenital arthrogryposis include in-utero infection with [Bluetongue virus](#) or [Akabane virus](#).

[Click here](#)

Which of the following plants is most likely to cause cyanide toxicity in a newborn calf? [Sorghum](#) ([Sudan grass](#), [Johnson grass](#), [Milo](#)) can cause a [neurologic toxicity](#), primarily in horses, or [cyanide toxicity](#).

[Click here](#) to see a [Table of toxic range plants in North America](#).

Refs: Pasquini's Guide to Bov Clin, 4th ed. pp. 220, **241** and the Merck Veterinary Manual online edition.

- Metald
- Brucella
- Sorghum
- Lupine s**
- Gossypol HIDE

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A 5-year old male neutered pit bull terrier that lives primarily outdoors in southern Florida is presented with an acute onset of inappetance, vomiting, ataxia and seizures.

The dog has a prior history of dietary indiscretion.

Physical examination reveals pink but icteric mucous membranes and dull mentation.

Labwork results reveal severe elevations in ALT, ALP, total bilirubin and pre- and post- bile acids.

The presumptive diagnosis is hepatotoxin ingestion based on the patient's history of indiscriminant eating.

Which one of the following plants may cause acute hepatotoxicity if ingested?

Foxglove	HIDE
Sago palm	HIDE
Oleander	HIDE
Marijuana	HIDE
Yew	HIDE

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Correct:

The dog Sago palm ingestion causes acute hepatic necrosis. Sago palm is highly lethal.

Physical Click here for an image of a sago palm tree.

Labwork acids. Typical clinical signs include hepatic encephalopathy, seizures, and hemorrhagic gastroenteritis.

The pres indiscrim Marijuana causes prolonged sedation, hypotension, bradycardia, hypothermia, and mydriasis.

Which or Hyperexcitability may occur. It is rarely lethal.

Foxglove	HIDE
Sago palm	HIDE
Oleander	HIDE
Marijuana	HIDE
Yew	HIDE

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Hyperexcitability may occur. It is rarely lethal.

A 5-year present Foxglove and oleander are cardiac glycosides.

The dog Cardiac arrhythmias, lethargy, GI upset, and hyperkalemia may occur. Both are highly lethal.

Physical Yew may cause vomiting, diarrhea, hypotension, bradycardia, tremors, and seizures.

Labwork acids. It is potentially lethal.

The pres indiscri Veterinary Manual online edition, and the Animal Society for the Prevention of Cruelty to Animals online.

Which or

Foxglove	HIDE
Sago palm	HIDE
Oleander	HIDE
Marijuana	HIDE
Yew	HIDE

- Welcome
- Community portal
- Village pump
- Help center
- Language select
- English
- Participate
- Upload file
- Recent changes
- Latest files
- Random file
- Contact us
- Print/export
- Download as PDF
- Tools
- What links here
- Related changes
- Special pages
- Permanent link
- Page information
- Cite this page
- Nominate for deletion

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Which one of the following choices lists toxic plants containing **cardiac glycosides** that cause cardiac arrhythmias, heart blocks, or asystoles?

Philodendron, Easter lily	HIDE
<i>Cannabis sativa</i> (marijuana), Poinsettia	HIDE
Taxus, Dieffenbachia	HIDE
Oleander, Foxglove	HIDE
Lantana, Phoradendron (mistletoe)	HIDE

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Which of the following are cardiac glycosides?

- Philodendron
- Cannabis
- Taxus, L.
- Oleander

Correct:

Oleander and foxglove contain cardiac glycosides. Toxicosis causes cardiac arrhythmias or asystole, hyperkalemia, vomiting and diarrhea. Can be LETHAL.

[Click here to see image](#) of oleander.

[Click here to see image](#) of foxglove.

Cardiac glycosides inhibit sodium-potassium ATPase pumps in myocardial cells. Effects include A-V block, increased vagal tone, decreased membrane potential, and decreased pacemaker activity.

Foxglove (*Digitalis spp.*) extracts are used to make DIGOXIN to treat cardiac patients. Serum digoxin level can confirm diagnosis of cardiac glycoside toxicity.

Lantana, Phoradendron (mistletoe) HIDE

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Rx: Early decontamination (e.g., induce vomiting, administer activated charcoal); anti-arrhythmics; symptomatic treatment for dehydration, electrolyte abnormalities and gastrointestinal (GI) upset.

Prognosis:

- Guarded if moderate to severe cardiovascular signs
- Good if GI upset WITHOUT cardiovascular signs

Which of the following is a cardiac glycoside?

- Philodendron
- Cannabis
- Taxus, L.
- Oleander

Other cardiotoxic plants (which contain GRAYANOTOXIN) include rhododendron, azalea, rosebay and laurels. Mechanism of action and Rx are similar to that of cardiac glycosides. Prognosis: generally good.

Refs: Cote, Clinical Veterinary Advisor–Dogs and Cats, 3rd ed. pp. 161-2 and Merck

Lantana, Phoradendron (mistletoe) HIDE

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oleander.



foxglove (*digitalis purpurea*)





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Which one of the following choices is the **primary toxic agent** contained in **Senecio** and **Amsinckia** plant species?

Aflatoxin	HIDE
Cardiac glycoside	HIDE
Pyrrrolizidine alkaloid	HIDE
Methemoglobin	HIDE
Zearalenone	HIDE

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Which of the following is a toxic agent found in plants of the *Amsinckia* spp.?

Aflatoxin

Cardiac glycosides

Pyrrrolizidine alkaloids

Methemoglobinemia

Zearalenone

Correct:

Pyrrrolizidine alkaloid (PA) is the toxic agent found in plants of the *Senecio* and *Amsinckia* spp.

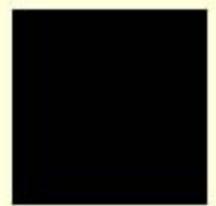
Chronic ingestion of PA containing plants results in hepatic fibrosis that eventually causes liver failure.

Refs: Pasquini's Guide to Bovine Clinics 4th ed., p. 233, Forero, Livestock-Poison Plants of CA, U of CA, Davis, ANR, pp. 7, 23 Knight and Walter's A Guide to Plant Poisoning of Animals in NA, pp. 144-6, 155-9, and the Merck Veterinary Manual online edition.

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Icterus, hemorrhage, and sudden death are primarily associated with which mycotoxin?

4-Ipomeanol	HIDE
Trichothecenes	HIDE
Aflatoxin	HIDE
Fumonisin	HIDE
Fescue mycotoxins	HIDE

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Icterus,

4-Ipome

Trichoth

Aflatoxi

Fumonis

Fescue mycotoxins

Correct:
 Aflatoxicosis is caused by toxigenic strains of *Aspergillus* (*A. flavus*, *A. parasiticus*) on peanuts, soybeans, corn (maize) and other cereal grains.

The liver is the major target organ, with widespread hemorrhages, icterus, and death in acute cases. Subacute outbreaks are more common, with nonspecific signs of anorexia, weakness, unthriftiness, and sudden death.

Think of lameness and hyperthermia in cattle and horses with fescue lameness, due to a toxin produced by an ergot-like mold (*Neotyphodium coenophialum*) on tall fescue grass.

4-Ipomeanol toxicity (moldy sweet potato) causes a respiratory disease.

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Icterus,

4-Ipome

Trichoth

Aflatoxin

Fumonis

Fescue mycotoxins

to a toxin produced by an ergot-like mold (*Neotyphodium coenophialum*) on tall fescue grass.

4-Ipomeanol toxicity (moldy sweet potato) causes a **respiratory disease**, indistinguishable from acute bovine pulmonary emphysema and edema (ABPEE).

Fumonisin is another *Fusarium* spp. mycotoxin associated with **moldy corn**. In **equids**, look for CNS disease (equine leukoencephalomalacia). In **pigs**, see hypertension and pulmonary edema (porcine pulmonary edema-PPE).

Click here to see a table of [Mycotoxinoses in Domestic Animals](#).

Refs: The Merck Veterinary Manual online edition.

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A 1-year-old male neutered golden retriever is presented for suspected snail bait ingestion. The dog was left in the garage overnight and some empty packaging was found near the dog this morning. The owner does not remember if the packages contained product.

Which one of the following clinical signs would be expected if ingestion occurred?

Epistaxis	HIDE
Tremors	HIDE
Miosis	HIDE
Hypothermia	HIDE
Bradycardia	HIDE

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11

Correct:

Tremors.

Metaldehyde toxicosis occurs 1-3 hours after **ingestion of snail/slug bait**. See severe muscle tremors, ataxia, hyperesthesia, anxiety, tachycardia and hyperthermia.

Other clinical signs include vomiting, diarrhea, opisthotonus, mydriasis and seizures.

Can be rapidly fatal without immediate intervention.

Treatment includes decontamination (induce emesis, administer activated charcoal), management of tremors/seizures and supportive care.

Although uncommon, acute hepatic and renal failure may occur. Closely monitor lab values for signs of organ dysfunction.

- A 1-year
- The dog
- dog this
- Which or
- Epistaxi
- Tremors
- Miosis
- Hypothermia
- Bradycardia

HIDE

HIDE

HIDE

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Which one of the following choices is the recommended **treatment** and **prognosis** for **lupine toxicity** in cattle?

- The prognosis is poor. There is no effective treatment. HIDE
- The prognosis is good. Rumenotomy with rumen lavage must be performed. HIDE
- The prognosis is guarded. Ascorbic acid is the effective antidote. HIDE
- The prognosis is grave. Diazepam can be given to prevent seizures. HIDE
- The prognosis is excellent. Intravenous fluids will dilute the toxins and promote excretion. HIDE

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Which of the following is not a sign of toxicity in lupine poisoning?

The prognosis is excellent.

The prognosis is poor.

The prognosis is good.

The prognosis is fair.

Correct:

The prognosis is poor. There is no effective treatment.

Lupines occur more commonly in the Western United States. Toxic alkaloids are found throughout the lupine plant. The highest concentration is found in seeds, so the plants are especially dangerous after they have set seed.

Not all lupines are highly toxic, but toxicity can still occur when they are ingested in large quantities and in a short period of time. Animals may be poisoned when lupine is mixed in hay or when grazing areas where forage is scarce.

Prevention of exposure is the best control measure. Identify poisonous plants in the forage area; test the hay. Prevent pregnant cows from ingesting lupine from days 40-70 of pregnancy, as congenital defects (crooked limbs, cleft palate) may occur during this time.

The prognosis is excellent. Intravenous fluids will dilute the toxins and promote excretion.

HIDE

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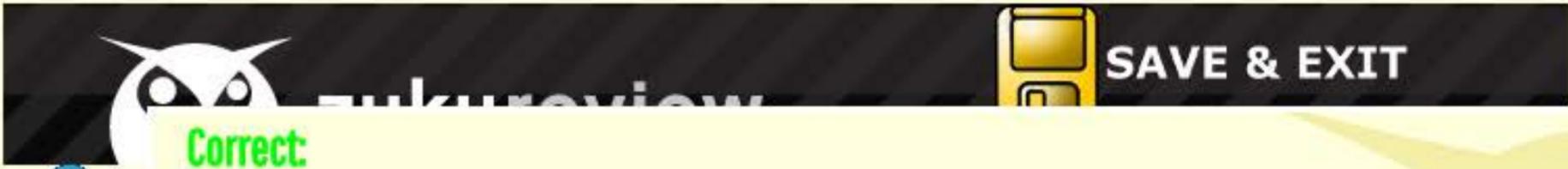
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If a dog eats a **deodorant cake** attached to a diaper pail, which toxic compound in the cake is most likely to make the dog sick?

Paradichlorobenzene	HIDE
Pentachlorophenol	HIDE
Halogenated aromatic	HIDE
Metalddehyde	HIDE
Polybrominated biphenyl	HIDE

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Correct

Paradichlorobenzene is an organochlorine insecticide, mainly affecting the CNS found in deodorizer cakes in diaper buckets, garbage cans and in bathrooms.

Typically a problem of dogs-animals present with tremors, salivation, ataxia and seizures.

Polybrominated biphenyls are part of the family of halogenated aromatics (bad pesticides like PCB, DDT, dioxins etc)

Metalddehyde is found in snail baits.

Pentachlorophenol has been used as a fungicide, molluscicide, insecticide, and wood preservative, but its use is now limited to industrial applications (Penta poisoning)

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If a dog is most l

Paradich

Pentach

Halogen

Metalde

Polybrominated biphenyl HIDE

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What **clinical signs** might be expected to be seen in a **cat** with **arsenic** toxicity?

Prostration, respiratory distress, severe anemia	HIDE
Polyuria, polydipsia, hemorrhagic cystitis	HIDE
Convulsions, opisthotonos, sudden death	HIDE
Icterus, acute renal disease, severe dehydration	HIDE
Hemorrhagic diarrhea, colic, weakness, salivation	HIDE

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Correct: Hemorrhagic diarrhea, colic, weakness, salivation

When you hear arsenic, think **severe GI signs**, including a hemorrhagic diarrhea. Cattle find arsenic on pesticide-contaminated foliage. Pets find arsenic in ant baits and in pressure treated wood (like on backyard decks) or wood preservative.

For CNS signs, remember "Bad LUC"- **Lead, Urea, Chlorinated hydrocarbons**.

Lead toxicity causes more **CNS signs**: (encephalopathy, blindness), can see diarrhea or constipation.

Urea toxicity- See wildly **aberrant behavior** in cattle ("**Bovine Bonkers**"), tremors, acute death. Rx, if time, with VINEGAR

Chlorinated hydrocarbons (insecticides like Lindane, Methoxychlor) look for **CNS depression or stimulation (convulsive seizures)**.

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What clir

Prostrat

Polyuria

Convuls

Icterus,

Hemorrhagic diarrhea, colic, weakness, salivation

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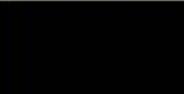
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Why are **cats** particularly **susceptible** to **toxicosis secondary** to ingestion of nonsteroidal anti-inflammatory drugs (**NSAIDs**) like aspirin, acetaminophen (Tylenol ®) and **ibuprofen**?

Glucuronyl transferase deficiency	HIDE
High liver to body mass index	HIDE
High metabolic rate compared with other species	HIDE
Excess cyclooxygenase (COX) interaction	HIDE
Low glomerular filtration rate compared with other species	HIDE

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Correct: Glucuronyl transferase deficiency

Cats are deficient in glucuronyl transferase, the hepatic enzyme that conjugates most NSAIDs with glucuronic acid as part of normal metabolism and breakdown of the drugs. It takes less drug to cause NSAID toxicosis in cats. Common NSAIDs include ibuprofen, carprofen (Rimadyl ®), aspirin, naproxen and acetaminophen (Tylenol ®).

Glucuro

Refs: Plumb's Vet Drug Handbook, 7th ed. pp. 204-10 and the Merck Veterinary Manual online edition.

High live

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Low glomerular filtration rate compared with other species HIDE

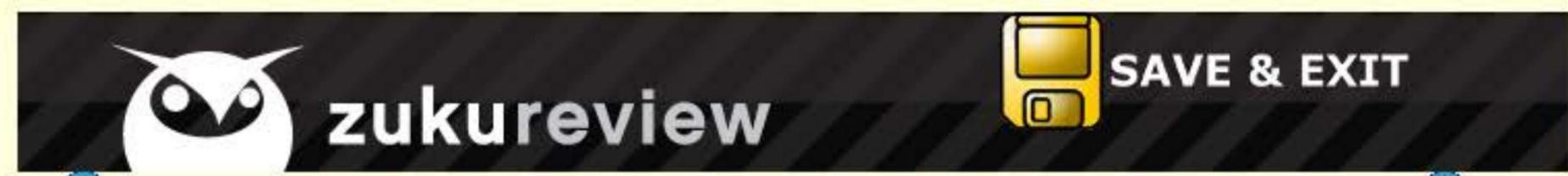
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Which fungal toxin is primarily associated with immunosuppression and vomiting?

Ergot	HIDE
Trichothecenes	HIDE
Fumonisin	HIDE
Zearalenone	HIDE
Fescue mycotoxins	HIDE

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11

Which fu

Ergot

Trichoth

Fumonis

Zearaler

Fescue mycotoxins

Correct:

Trichothecenes are a group of related cytotoxic mycotoxins associated with many fungi. Think of vomitoxin (and vomiting) and also of immunosuppression. Refusal to eat contaminated feed is a typical sign, due to taste aversion. Macrocytic trichothecene-related diseases have several specific names, including the best known, stachybotryotoxicosis.

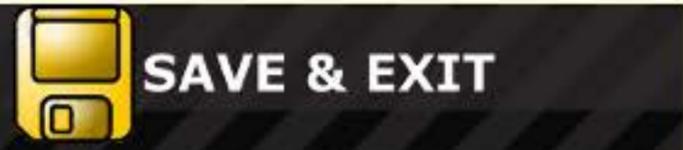
Think of lameness and hyperthermia in cattle and horses with fescue, due to an ergot-like mold on tall fescue grass.

Click here to see a table of Mycotoxinoses in Domestic Animals.

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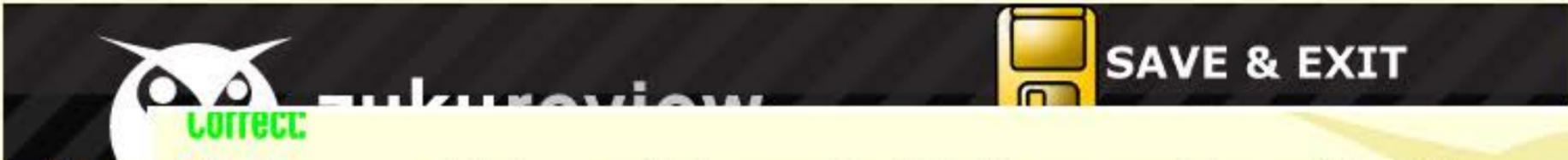
A 5-month old steer is presented that is unthrifty-looking and failing to gain weight. He appears somewhat lame, has a rough, light-colored hair coat and depigmented hair around his eyes like spectacles.

The steer has a watery dark diarrhea full of gassy bubbles.

What is the diagnosis?

Magnesium deficiency	HIDE
Copper deficiency	HIDE
Quercus (Oak) poisoning	HIDE
Selenium toxicity	HIDE
Molybdenum deficiency	HIDE

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This is **copper deficiency**, which presents clinically as poor doing cattle, with achromotrichia (depigmented hair, especially around the eyes= "spectacles" most notable in black cattle) rough coat, decreased milk yield, lameness and decreased fertility, libido and "Peat Scours" also called "Teart" (severe scours with gas bubbles).

Molybdenum toxicosis causes a secondary deficiency in copper.

Oak poisoning is more a gradual, multisystemic disease (**nephrotoxic, hepatotoxic**), can see PU/PD, hematuria, weight loss.

Downer cattle with tetany is the classic presentation of **hypomagnesemia** in cattle, along with hyperexcitability, ataxia, convulsions and death.

Selenium toxicosis has many presentations **depending on animal, dose and length of time exposed.**

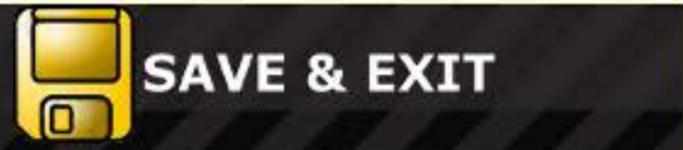
A 5-mon
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What is t

Magnesi

Copper deficiency	HIDE
Quercus (Oak) poisoning	HIDE
Selenium toxicity	HIDE
Molybdenum deficiency	HIDE

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A dog is presented with a history of eating a shiny new United States penny that was hidden in a piece of birthday cake.

What problem may result?

Nickel toxicity	HIDE
Lead poisoning	HIDE
Iron poisoning	HIDE
Zinc toxicity	HIDE
Molybdenum poisoning	HIDE

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Think of [zinc toxicosis](#) associated with ingestion of U.S. Lincoln pennies. All pennies minted since 1984 (and a few in 1983), are **97.5% zinc by weight**.

Click here to see a [radiograph of a dog who ate a penny](#).

Other sources of zinc include batteries, car parts, paint, zinc-oxide sunscreen creams, zippers, board-game pieces, screws and nuts on pet carriers, and the coating on galvanized metals like plumbing pipes and some cookware.

What pro [Copper toxicity](#) is typically associated with copper containing drenches for sheep, or improperly formulated rations.

Nickel to [Molybdenum poisoning](#) is an uncommon problem of cattle.

Lead po [Iron poisoning](#) is a sporadic **problem of newborn piglets** overdosed by iron injection.

Zinc toxicity	HIDE
Molybdenum poisoning	HIDE

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A 3 year-old domestic longhair female spayed **cat** is presented with **hypersalivation, vomiting, diarrhea, tremors, ataxia and a temperature** of 105.2 F (**40.7 C**)..[N=100-103.1 F, N=37.8-39.5 C]. Her pupils are normal size and responsive to light. The cat has a seizure while being examined.

The owner relates that he had **treated** her the night before with a **flea dip** he had originally bought for his dog.

What **toxic ingredient** most likely **caused** these symptoms?

D-Limonene	HIDE
Carbamate	HIDE
Organophosphate	HIDE
Permethrin	HIDE
Methylxanthine	HIDE

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21 22 23 24 25 26 27 28 29 30

Correct: Permethrin

A 3 year vomiting N=37.8- while bei The own bought f What tox

Permethrin toxicity in cats is relatively common occurrence after being treated with a concentrated permethrin-containing **flea product labeled for dogs**. Rx with **METHOCARBAMOL** (Robaxin ®) a centrally-acting muscle relaxant and **if needed, with seizure control** (ie: diazepam, pentobarbitol, or inhalant anesthesia). **UNLIKE OPP/carbamate toxicities, DO NOT Rx permethrin toxicity with Atropine**

Big DDXs are Organophosphate (OPP) toxicity, and Carbamate toxicity which look similar. With OPP and Carbamates, may see MIOSIS, UNlike permethrin/pyrethroid toxicity.

D-Limonene is a citrus-based anti-flea med that can cause vomiting in dogs.

D-Limonene	
Carbamate	
Organophosphate	HIDE
Permethrin	HIDE
Methylxanthine	HIDE

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Which one of the following choices cause cardiac arrhythmias and gastroenteritis?

<i>Dieffenbachia</i> spp.	HIDE
<i>Agave americana</i>	HIDE
<i>Cannabis sativa</i>	HIDE
<i>Rhododendron</i> spp.	HIDE
<i>Prunus</i> spp.	HIDE

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Correct:

Azaleas (*Rhododendron spp.*) contain alkaloids that cause both cardiac arrhythmias and severe gastric distress.

Which of the following is correct?

Dieffenbachia

Agave americana

Cannabis

Rhododendron

Prunus spp.

Follow this link to a Merck table with [images of toxic range plants.](#)

Follow this link to a Merck table with [images of toxic ornamental and house plants.](#)

Refs: The Merck Veterinary Manual online edition.

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Which one of the following **clinical pathology abnormalities** is frequently seen with **acetaminophen toxicity** in **cats**?

Polycythemia	HIDE
Calcium oxalate crystalluria	HIDE
Methemoglobinemia	HIDE
Eccentrocytes (blister cells)	HIDE
Thrombocytopenia	HIDE

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Which of the following is not a side effect of acetaminophen?

Polycythemia

Calcium deficiency

Methemoglobinemia

Eccentric pupils

Thrombocytopenia

Correct: Methemoglobinemia

See [methemoglobinemia](#) (brown blood) and [methemoglobinuria](#) (brown urine). Oxidative damage to RBC causes [heinz body anemia](#).

Click here for more information on [heinz body anemia](#) on Cornell's eClinPath website.

More frequent in cats than dogs. [Cats are deficient in glucuronyl transferase](#), so they have a limited ability to metabolize acetaminophen and aspirin.

Follow this link to a [Merck table: Toxic causes of anemia](#).

Refs: Blackwell's 5-Minute Vet Consult Canine Feline, 4th ed. pp. 10-11, Pasquini's, Tschauner's Guide to Small Animal Clinics, vol 1, 2nd ed. p. 731 and the Merck

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A 2 year old Angus cow is presented with weakness of the hind limbs and a staggering gait. On physical exam, the heart rate and respiratory rate are slow and irregular, and the pupils are dilated. The cow's breath and urine smell like the odor of mouse urine. Suddenly the cow's pulse becomes rapid and thready, she collapses, and dies of apparent respiratory failure. Which one of the following plants is most likely to have caused this spectrum of clinical signs?

<i>Centaurea</i> spp (Knapweed, Yellow star thistle)	HIDE
<i>Conium maculatum</i> (Poison hemlock)	HIDE
<i>Pinus ponderosa</i> (Western yellow pine)	HIDE
<i>Tetradymia</i> spp (Horsebrush)	HIDE
<i>Veratrum</i> spp (False hellebore, Skunk cabbage)	HIDE

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A 2 year
On physi
are dilate
The cow
Suddenly
respirato
Which or
signs?

Correct:

Poisoning with **Conium maculatum (Poison hemlock)** is responsible for the death of this cow.

At least 8 toxic piperidine alkaloids have been isolated from poison hemlock.

Coniine is found in seeds and the mature plants; g-coniceine is found in young growing plants.

Poison hemlock is toxic to all livestock and humans. Signs of toxicity develop 1-2 hours after ingestion and are usually fatal.

Signs include nervousness, trembling, weakness especially of the hind limbs, weak pulse, irregular heart rate, recumbency, coma and death.

Centaur

<i>Conium maculatum</i> (Poison hemlock)	HIDE
<i>Pinus ponderosa</i> (Western yellow pine)	HIDE
<i>Tetradymia</i> spp (Horsebrush)	HIDE
<i>Veratrum</i> spp (False hellebore, Skunk cabbage)	HIDE

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A mousy odor exuding from the urine and breath is pathognomonic.

A 2 year
On physi
are dilate
The cow
Suddenly
respirato
Which or
signs?

Ingestion of poison hemlock during gestation causes arthrogryposis and other congenital defects in cattle, goats, and pigs.

Click here to see an image of [Conium maculatum \(Poison hemlock\)](#).

[Click Here](#) to see a Merck table of Poisonous Range Plants of Temperate North America.

Refs: Forero, Livestock-Poison Plants of CA, U of CA, Davis, ANR, p. 39, Knight and Walter's A Guide to Plant Poisoning of Animals in NA, pp. 38-40, 282, and the Merck Veterinary Manual online edition.

Centaur

<i>Conium maculatum</i> (Poison hemlock)	HIDE
<i>Pinus ponderosa</i> (Western yellow pine)	HIDE
<i>Tetradymia</i> spp (Horsebrush)	HIDE
<i>Veratrum</i> spp (False hellebore, Skunk cabbage)	HIDE

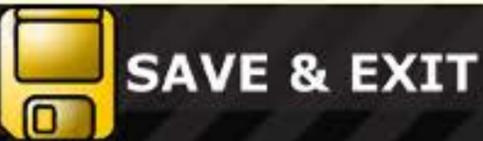
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Conium maculatum



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Zearalenone intoxication is primarily associated with which clinical signs?

Immunosuppression, hemorrhagic diathesis	HIDE
Estrogenism, vulvovaginitis	HIDE
Terminal necrosis of extremities, gangrene	HIDE
Salivation, vomiting	HIDE
Leukoencephalomalacia, hypertension	HIDE

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- 21 ✓
- Zearalen
- Immunc
- Estroger
- Termina
- Salivatic
- Leukoencephalomalacia, hypertension

Correct: Estrogenism, vulvovaginitis

Think of reproductive dysfunction (estrogenism, vulvovaginitis) with zearalenone, the only known mycotoxin with primarily estrogenic effects.

Zearalenone is produced by *Fusarium* spp. molds on plants and common feed grains like corn, barley, and wheat.

Often a second mycotoxin called **deoxynivalenol** is also produced, which causes **decreased feed intake**.

The presence of deoxynivalenol may limit exposure to zearalenone if the animal eats less.

Fumonisin is another *Fusarium* spp. mycotoxin associated with moldy corn. In **equids**, look for CNS disease (equine leukoencephalomalacia).

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In pigs, see hypertension and pulmonary edema (porcine pulmonary edema-PPE).

Ergotism is caused by ingestion of alkaloids in a parasitic fungus, *Claviceps purpurea*, that infects small grains (rye, wheat) and forage plants like bromes, bluegrass, and ryegrass.

Zearalenone Look for vasoconstriction with **terminal necrosis** of the extremities due to thrombosis-affected animals are predisposed to frostbite and gangrene.

Immunc... May have CNS effects, potent oxytocic action or pituitary effects (decreased prolactin leading to agalactia).

Estrogen

Termina... **Slaframine toxicosis** causes **profuse salivation**, primarily in horses and occasionally in cattle.

Salivatic... Due to the **fungus *Rhizoctonia leguminicola*** (**black patch disease**) on **red clover**

Leukoencephalomalacia, hypertension

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Due to the fungus *Rhizoctonia leguminicola* (black patch disease) on red clover (*Trifolium pratense*) especially in wet, cool years.

21 [Trichothecenes](#) are a group of related cytotoxic mycotoxins associated with many fungi.

Zearalen Think of vomitoxin (and **vomiting**) and also of **immunosuppression**. Refusal to eat contaminated feed is a typical sign, due to taste aversion.

Immunc **Macrocyclic trichothecene** related diseases have several specific names, including the best known, **stachybotryotoxicosis**.

Estroge

Termina Click here to see a table of [Mycotoxinoses in Domestic Animals](#).

Salivatic Refs: The Merck Veterinary Manual online edition.

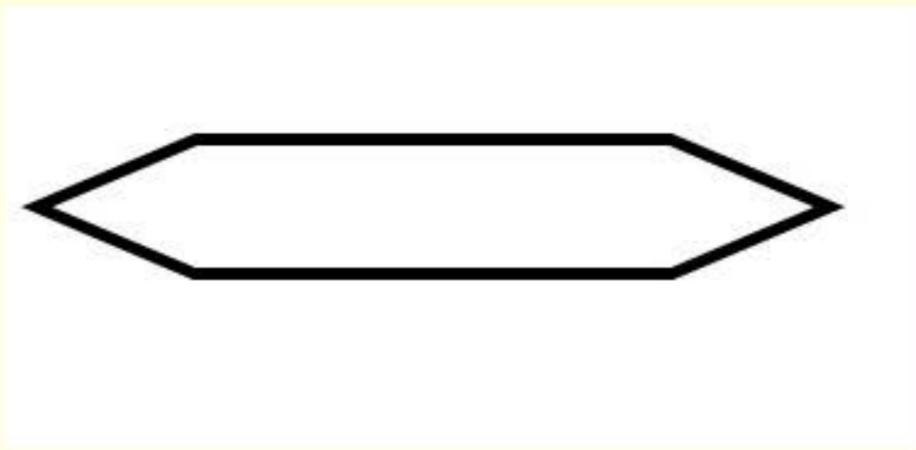
Leukoer neutrophilia, hypertension

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A polyuric, lethargic, ataxic dog is presented with an 8 hour duration of clinical signs. The dog is dehydrated, and bloodwork shows azotemia, acidosis, and marked serum hyperosmolality. A urinalysis demonstrates isosthenuria and crystals like flattened hexagons or picket fence boards.



Which one of the following would be the best choice to confirm the most likely diagnosis?

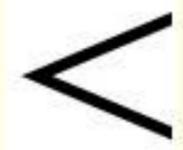
Abdominal radiographs	HIDE
Ethylene glycol test kit	HIDE
High performance liquid chromatography on plasma to detect cyanotoxins	HIDE
Determination of plasma nitrate concentrations	HIDE
Liver biopsy to measure copper levels	HIDE

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A polyuric dog is dehydrated, hyperosmotic, or picket

Correct:

Ethylene glycol toxicosis is the most likely cause of the clinical signs and clinical pathology findings in this dog. Commercial test kits, such as Kacey EG Test Strips and the VetSpec EG Qualitative Reagent Test Kit, are available to detect ethylene glycol in blood and urine. It is important to note that administration of medications such as valium or some preparations of activated charcoal that contain propylene glycol prior to the use of an ethylene glycol test kit may cause a false positive result.



Dogs with ethylene glycol poisoning present acutely with "drunken sailor" behavior within 1-2 hours of ingestion. Over hours, dogs become quiet, depressed, polydipsic, and polyuric, gradually demonstrating weakness, ataxia, and ultimately oliguria. The exposure to ethylene glycol is not always noted by the owner so you may need to ask additional questions to find out if ingestion of ethylene glycol by the animal was a possibility if consistent clinical signs are observed.

Which of

Abdominal radiographs	HIDE
Ethylene glycol test kit	HIDE
High performance liquid chromatography on plasma to detect cyanotoxins	HIDE
Determination of plasma nitrate concentrations	HIDE
Liver biopsy to measure copper levels	HIDE



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Which one of the following canine urine sediment findings is most commonly seen within 6 hours after ethylene glycol ingestion?

Ammonium biurate crystals (yellow-brown thornapples)	HIDE
Calcium carbonate crystals (dumbbells or balls with spokes)	HIDE
Calcium oxalate monohydrate (6-sided prisms/spindles)	HIDE
Bilirubin crystals (yellow-amber antlers)	HIDE
Urate crystals (Amorphous)	HIDE

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- 21
- Which or hours aft
- Ammoni
- Calcium
- Calcium**
- Bilirubin

Correct: Calcium oxalate monohydrate (6-sided prisms/ spindles)

The preferred answer is calcium oxalate monohydrate (6-sided prisms/spindles ("picket fences")), which can appear as early as 3 hours post-ingestion in cats and 6 hours post- in dogs.

Click here to see an image of "picket fence" calcium oxalate monohydrate crystals (image on right) on Cornell's eClinPath website.

Bilirubin crystals can actually be seen in **normal dogs** (though they are NOT normal in other animals). See also ethylene glycol toxicity, Merck, 9th ed.

Refs: Merck Veterinary Manual online edition.

Urate crystals (Amorphous) HIDE

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A large round bale of Milo hay was placed in a pasture with a group of mixed breed beef cattle of various ages. Five hours later three cows were dead, four were recumbent and in distress, and six other cows were ataxic and depressed.

On physical examination of all the affected cows, the mucus membranes were a gray color with poor capillary refill time, the extremities were cold, pulse rates were over 140 beats per minute [N=55-80bpm], and rectal temperatures were below 98 F (36.7 C)[N=100-102.5 F, N=37.8-39.7 C].

The feces were normal in consistency and color, and the urine was normal in appearance.

Blood from one of the down animals was collected and is shown below. Which one of the following choices is the most likely diagnosis?





Redwater disease	HIDE
Blue-green algae poisoning	HIDE
Cyanide poisoning	HIDE
Oleander poisoning	HIDE
Nitrate poisoning	HIDE

Correct:

Nitrate poisoning is the most likely diagnosis in this case. However, based on the history alone, all of the answers are potential causes, as **circulatory collapse and sudden death can be seen with all these choices.**

Laboratory analysis of rumen contents and gross examination of the blood **can help differentiate the conditions.**

Clinical signs of cyanide and nitrate poisonings can be similar since both result in tissue anoxia.

Blood from **nitrate poisoned cattle** contains **methemoglobin**, which confers a **brownish discoloration**, whereas blood from **cyanide poisoned animals** contains **cyanohemoglobin** which is **bright red**.

Redwater
Blue-green

Cyanide poisoning	HIDE
Oleander poisoning	HIDE
Nitrate poisoning	HIDE

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Mucus membranes from nitrate poisoned cows are gray colored, while membranes from cyanide poisoned animals are very intensely red.

In this case, the hay bale contained 100,000 ppm of nitrate; less than 10,000 ppm is normal. Aqueous humor was positive for nitrates, and serum from affected cattle contained more than 1000 micrograms/ml of nitrate and nitrite; normal is less than 10 micrograms/ml).

Remember that nitrate is the most common form of nitrogen in stored products.

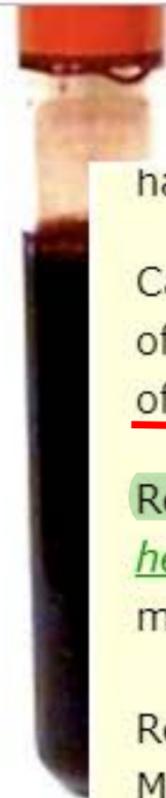
Rumen conversion of nitrate to nitrite increases toxicity 10X. The treatment of nitrate poisoning is methylene blue.

Cattle can die rapidly and unexpectedly after ingesting plants with cardiac glycosides.

Redwater Mucus membrane color and blood appear normal in these animals. They frequently have diarrhea and hematochezia prior to death.
Blue-green

Cyanide poisoning	HIDE
Oleander poisoning	HIDE
Nitrate poisoning	HIDE

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have diarrhea and hematochezia prior to death.

Cattle can also die rapidly after ingesting blue green algae. Usually there is evidence of the algal bloom on the muzzles, and the animals die very close to the water source of the algae. If seen prior to death, bradycardia and salivation are frequently present.

Redwater disease is an intravascular hemolytic crisis caused by Clostridium hemolyticum. The urine is brown to black from hemoglobinuria, mucous membranes may be quite icteric, the plasma and serum are often pink.

Refs: Pasquini's Guide to Bovine Clinics, 4th ed. pp. 90, 222, 230-1, 237, and the Merck Veterinary Manual online edition. Image courtesy Dr. Lisle George copyright 2010

Redwater	
Blue-green	
Cyanide poisoning	HIDE
Oleander poisoning	HIDE
Nitrate poisoning	HIDE

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A 13-year-old Quarterhorse mare presents with an acute onset of continuous chewing movements, frequent yawning, and lip curling. Frothy saliva is present on her muzzle, and she often appears to grimace, repeatedly tensing her lips and facial muscles.

Her gait is normal, however, she often walks aimlessly with her head low. She is unable to eat or drink normally. The owner has observed her submerging her head deeply into her water bucket, then tipping her head back in an attempt to drink.

Ingestion of which one of the following plants is most likely to cause this spectrum of clinical signs?

<i>Quercus</i> spp. (oak)	HIDE
<i>Centaurea</i> spp. (yellow star thistle, Russian knapweed)	HIDE
<i>Tetradymia glabrata</i> (horsebrush)	HIDE
<i>Xanthium</i> spp. (cocklebur)	HIDE
<i>Acer rubrum</i> (red maple)	HIDE

BACK NEXT I FAVE RI ANK

Her gait is normal, however, she often walks aimlessly with her head low. She is unable to eat or drink normally. The owner has observed her submerging her head deeply into her water bucket, then tipping her head back in an attempt to drink.

Ingestion signs?

Correct:

Quercus

Tetradym

Centaurea

Xanthox

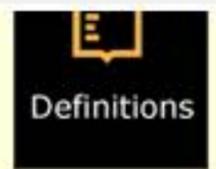
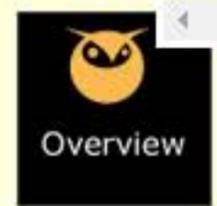
Acer rub

BACK

Chronic ingestion of **Centaurea spp. (yellow star thistle, Russian knapweed)** causes this presentation of clinical signs. Several toxic substances have been isolated from the plants, however, a dopaminergic neurotoxin is thought to be the principle toxin. Both fresh and dried plants are poisonous.

Also called "chewing disease," characteristic signs of toxicity are involuntary chewing movements, twitching of the lips, facial hypertonicity, an open mouth with a protruding tongue, lip curling, frothy saliva, and frequent yawning.

Horses are unable to prehend or chew, although they can still swallow. The disease is also called Nigropallidal Encephalomalacia because malacia of two of the basal ganglia, the substantia nigra and the globus pallidus, is seen on necropsy.



[Change My Background Colors](#)

Her gait is normal, however, she often walks aimlessly with her head low. She is unable to eat or drink normally. The owner has observed her submerging her head deeply into her water bucket. then tipping her head back in an attempt to drink.

Ingestion signs?

The tendency to put the head all the way down into the water to try and drink is a classic sign of this disease.

The damage is irreversible, therefore euthanasia is recommended.

[Click here](#) to see an image of *Centaurea* spp.

[Click here](#) to see a Merck table of Poisonous Range Plants of Temperate North America.

Refs: Forero, Livestock-Poison Plants of CA, U of CA, Davis, ANR, p. 35, Knight and Walter's A Guide to Plant Poisoning of Animals in NA, pp. 225-8, and the Merck Veterinary Manual online edition.

- Quercus
 - Tetradymis
 - Centaurea**
 - Xanthoxylum
 - Acer rubrum
- BACK

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Centaurea solstitialis (Yellow star thistle, Yellow knapweed)





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Which fungal toxin may cause **estrogenism** and vulvovaginitis?

Zearalenone	HIDE
Ergot	HIDE
Fumonisin	HIDE
Slaframine	HIDE
Trichothecenes	HIDE

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Which fu

- Zearale
- Ergot
- Fumonis
- Slafram
- Trichothecenes

Correct:
 Zearalenone. All of these choices are mycotoxins. Click here to see a table of [mycotoxicoses in domestic animals](#).

Think of reproductive dysfunction (estrogenism, vulvovaginitis) with **zearalenone**, the only known mycotoxin with primarily estrogenic effects.

Zearalenone is produced by *Fusarium* spp. molds on plants and common feed grains like corn, barley and wheat.

Often a second mycotoxin called **deoxynivalenol** is also produced which causes decreased feed intake.

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31

Which fu

Zearalen

Ergot

Fumonis

Slafram

Trichothecenes

Fumonisin is another *Fusarium* spp. mycotoxin associated with moldy corn.

In equids, look for CNS disease (equine leukoencephalomalacia). In pigs, see hypertension and pulmonary edema (porcine pulmonary edema-PPE).

Ergotism is caused by ingestion of alkaloids in a parasitic fungus, *Claviceps purpurea*, that infects small grains (rye, wheat) and forage plants like bromes, bluegrass, and ryegrass.

Look for vasoconstriction with terminal necrosis of the extremities due to thrombosis-affected animals are predisposed to frostbite and gangrene.

May have CNS effects, potent oxytocic action or pituitary effects (decreased prolactin leading to agalactia).

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A 3-month old calf is presented for necropsy. She collapsed and suddenly died in the morning after she escaped and was chased around the back pasture for half an hour by the farmer.

Endocardial plaques are found in the left ventricle of this calf's heart.

What is the diagnosis?

Gossypol (cottonseed) toxicity	HIDE
Bovine leukosis	HIDE
White muscle disease	HIDE
Ionophore toxicosis	HIDE
Enterotoxemia	HIDE

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Correct

Think [White Muscle Disease](#) when you see SUDDEN DEATH and endocardial PLAQUES in a young calf, lamb or kid with a history of recent VIGOROUS EXERCISE. Follow this link to a [Merck image of pale ventricular myocardium](#).

A 3-mon morning farmer.

Typically seen in young, fast-growing animals (ie/: calves 2 weeks-6 mos) Clinical signs may include dyspnea (due to myocardial disease), stiff gait, arched back, weakness, recumbent but BAR (bright, alert, responsive).

Endocard What is t

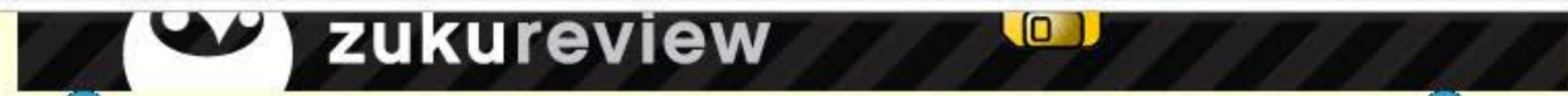
Sudden death may resemble [enterotoxemia](#), should see acute bloody diarrhea, convulsions, opisthotonos in first days of life with enterotoxemia.

Gossypc

Refs: Pasquini's Guide to Bovine Clinics, 4th ed. pp. 78, 250 and the Merck Veterinary Manual online edition.

Bovine leukosis	HIDE
White muscle disease	HIDE
Ionophore toxicosis	HIDE
Enterotoxemia	HIDE

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A local beef cattle herd has been experiencing reproductive losses in cows during the last three months of gestation. Three cows have aborted; two of these cows retained their placentas.

A few days prior to the abortions, the owner thought the cows' vulvas were swollen and noted a bloody mucoid vaginal discharge. The owner also reports a very weak calf was born on the farm last week, and the dam is not producing a sufficient amount of milk to feed him.

Ingestion of which one of the following plants is most likely to be the cause of reproductive loss on this farm?

<i>Centaurea</i> spp. (knapweed, yellow star thistle)	HIDE
<i>Tetradymia glabrata</i> (horsebrush)	HIDE
<i>Xanthium</i> spp. (cocklebur)	HIDE
<i>Pinus ponderosa</i> (Ponderosa pine)	HIDE
<i>Acer rubrum</i> (red maple)	HIDE

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A local b
three mc
placenta

Correct:

Ingestion of ***Pinus ponderosa* (Ponderosa pine)** is the most likely cause of reproductive losses on this farm.

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him.

Pine needles and bark contain the toxin isocupressic acid, which causes vasoconstriction and ischemia to the uterus and other tissues. **Abortion occurs 2-21 days after exposure.** Cows are at **greatest risk the last three months of pregnancy.**

Ingestion
loss on t

Edema of the vulva and udder and a bloody mucoid vaginal discharge are often seen just prior to abortion. Retained placenta is common after aborting. Calves not aborted are born weak and cows do not produce sufficient colostrum or milk.

Centaurea

[Click here](#) to see an image of Ponderosa pine.

Tetradymia

[Click Here](#) to see a Merck table of Poisonous Range Plants of Temperate North America.

Xanthoxylum

<i>Pinus ponderosa</i> (Ponderosa pine)	HIDE
<i>Acer rubrum</i> (red maple)	HIDE

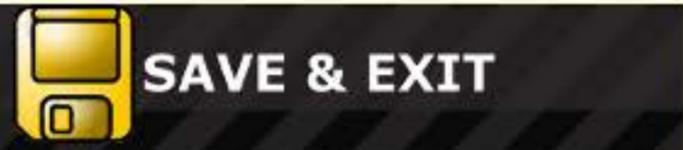
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Ponderosa pine





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Which group can all cause cardiomyopathy in ruminants?

Monensin, Copper toxicity, Gossypol (cottonseed)	HIDE
Vitamin E deficiency, <i>Claviceps</i> spp., Lead	HIDE
Gossypol (cottonseed), Lymphosarcoma, Monensin	HIDE
Lasalocid, Polioencephalomalacia, Copper toxicity	HIDE
<i>Cassia occidentalis</i> (coffee senna), Lead, Selenium deficiency	HIDE

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Which gr

Monensi

Vitamin

Gossypol

Lasaloci

Cassia occidentalis (coffee senna), Lead, Selenium deficiency

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Correct: Gossypol (cottonseed), Lymphosarcoma, Monensin

Cardiomyopathy in cattle can be caused by gossypol (cottonseed), lymphosarcoma, and monensin (as well as lasalocid-both are ionophore feed additives).

In addition, can see cardiomyopathy with selenium/vitamin E deficiency (white muscle disease), copper deficiency (myocardial fibrosis) and Cassia poisoning (coffee senna).

Refs: Pasquini's Guide to Bovine Clinics, 4th ed. pp. 78, Osweiler's NVMS Toxicology pp. 375, 346 and the Merck Veterinary Manual online edition.



zukureview



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Which one of the following statements regarding **smoke inhalation** is true?

Cyanide, carbon monoxide poisoning are common	HIDE
Upper airway thermal injury is immediately apparent	HIDE
Pulse oximetry is best method for diagnosing smoke inhalation	HIDE
Birds are the least likely to be affected	HIDE
Inhalation of steam does not affect the lower airway	HIDE

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Correct: Cyanide, carbon monoxide poisoning are common

Both cyanide and carbon monoxide poisoning are common with smoke inhalation.

Birds are often most susceptible to inhaled toxicants associated with smoke because of their physiology and anatomy.

They have large respiratory surface areas compared to their size and a greater respiratory minute volume per unit mass.

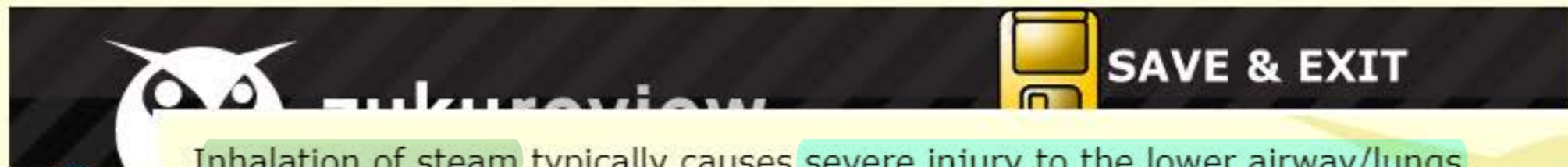
Pets who live in homes with smokers have significantly higher risk of cancer and toxicity - esp. the nasal cavity of long-nosed dogs, malignant lymphoma in cats, and pneumonia or lung cancer in birds.

Check out this article from the AVMA for more info - [Stop Smoking for Your Health and Your Pets Health.](#)

- Which of
- Cyanide
- Upper a
- Pulse ox
- Birds an
- Inhalation of steam does not affect the lower airway

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- Which or
- Cyanide
- Upper a
- Pulse ox
- Birds an
- Inhalation of steam does not affect the lower airway

Inhalation of steam typically causes severe injury to the lower airway/lungs.

Airway damage usually peaks at 12-24 hours so is often underestimated at first evaluation.

Pulse oximetry is usually inaccurate due to the frequent presence of carboxyhemoglobin and/or methemoglobin.

Bronchoscopy and laryngoscopy are the gold standards for assessing the damage associated with smoke inhalation.

Refs: The American Veterinary Medical Association and the Merck Veterinary Manual online.



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A group of 2 1/2-month-old feeder pigs are presented with non-pruritic keratinized skin lesions and mild lethargy. One severely affected animal is depressed and anorexic.

[Click here to see image 1](#)

[Click here to see image 2](#)

What treatment is most appropriate for the presumptive diagnosis?

Ivermectin SQ now, repeat in 2 weeks	HIDE
Copper sulphate bath or sprays	HIDE
Supplement dietary zinc	HIDE
High dose trimethoprim-sulfonamide 7-10 days	HIDE
Spray with malathion (0.05%)	HIDE

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Courtesy of Dr. Ranald D. A. Cameron.

LOCATION(S) • Overview of Parakeratosis

Parakeratosis, typical lesions, pig

photo size: small | high



Parakeratosis lesions are typically confined to the lower and ventral abdomen, thorax, limbs, and feet.

Courtesy of Dr. Ranald D. A. Cameron.

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Correct:

A group lesions a

[Click her](#)

[Click her](#)

What tre

Ivermec

Copper

Supplen

In pigs, zinc deficiency causes parakeratosis. Zinc supplementation will resolve clinical signs.

Starter diets should contain 125 ppm zinc (and 0.9% calcium)

Grower diets should contain 75 ppm zinc (and 0.60-0.65% calcium)

Finisher diets should contain 50 ppm zinc (and 0.45 to 0.50% calcium)

Parakeratosis may resemble exudative dermatitis ("greasy pig disease"), caused by *Staphylococcus hyicus*. Exudative dermatitis is more typically seen in younger suckling piglets and treated with antibiotics.

Sarcoptic mange (*Sarcoptes scabiei var suis*) is typically pruritic and treated with antiparasitics like ivermectin or pigs may be sprayed with lindane (0.05-0.1%) or malathion (0.05%).

High dose trimethoprim-sulfonamide 7-10 days	HIDE
Spray with malathion (0.05%)	HIDE

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Chronic ingestion of plants in the *Senecio*, *Amsinckia*, and *Crotalaria* genuses can lead to hepatic toxicity in horses due to which toxic factors?

Nitrate and nitrites	HIDE
Oxalates and Glycosides	HIDE
Swainsonines	HIDE
Slaframines	HIDE
Pyrrrolizidine alkaloids	HIDE

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31

Chronic i
hepatic t

Nitrate a

Oxalate

Swainso

Slafram

Correct:

Senecio spp., *Amsinckia intermedia*, *Cynoglossum officinale*, and *Crotalaria* spp. all contain **pyrrolizidine alkaloids**, which have toxic effects on hepatocytes characterized by **megalocytosis, fibrosis, and bile duct hyperplasia**.

While acute intoxications can occur, chronic poisonings are more common. Extensive fibrosis bridging portal areas is a poor prognostic indicator as **these changes are irreversible**.

Refs: Smith, Large Animal Internal Medicine, 4th ed., pp. 904-5 and the Merck Veterinary Manual online edition.

Pyrrolizidine alkaloids HIDE

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Slaframine intoxication is primarily associated with which **clinical signs**?

Estrogenism, vulvovaginitis	HIDE
Salivation, retching	HIDE
Icterus, hemorrhages	HIDE
Terminal necrosis of extremities, gangrene	HIDE
Leukoencephalomalacia, hypertension	HIDE

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Slaframini

Estrogen

Salivatio

Icterus,

Termina

Leukoer

neutrophilia, hypertension

Correct: Salivation, retching

Slaframini toxicosis causes profuse salivation, oral irritation, retching and sometimes vomiting, primarily in horses and occasionally in cattle.

Due to the fungus Rhizoctonia leguminicola (black patch disease) on red clover (*Trifolium pratense*) especially in wet, cool years.

Think of reproductive dysfunction (estrogenism, vulvovaginitis) with zearalenone, the only known mycotoxin with primarily estrogenic effects.

Zearalenone is produced by *Fusarium* spp. molds on plants and common feed grains like corn, barley and wheat.

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Often a second mycotoxin called **deoxynivalenol** is also produced which causes **decreased feed intake**. The presence of deoxynivalenol may limit exposure to zearalenone if the animal eats less.

Fumonisin is another *Fusarium* spp. mycotoxin associated with moldy corn. In **equids**, look for CNS disease (Equine leukoencephalomalacia).

In **pigs**, see hypertension and pulmonary edema (porcine pulmonary edema-PPE).

Ergotism is caused by ingestion of alkaloids in a parasitic fungus, *Claviceps purpurea*, that infects small grains (rye, wheat) and forage plants like bromes, bluegrass and ryegrass.

Look for vasoconstriction with **terminal necrosis of the extremities** due to thrombosis-affected animals are predisposed to frostbite and gangrene.

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May have CNS effects, potent oxytocic action or pituitary effects (decreased prolactin leading to agalactia).

31 [Aflatoxicosis](#) is caused by toxigenic strains of *Aspergillus* (*A. flavus*, *A. parasiticus*) on peanuts, soybeans, corn (maize) and other cereal grains.

Slaframid The **liver** is the major **target organ**, with **widespread hemorrhages**, **icterus** and death in acute cases.

Estrogen Subacute outbreaks are more common, with nonspecific signs of anorexia, weakness, unthriftiness and sudden death.

Salivatio

Icterus, Click here to see a table of [Mycotoxicoeses in Domestic Animals](#).

Termina Refs: The Merck Veterinary Manual online edition.

Leukoencephalomyelopathy, hypertension

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What is the **treatment** of choice for a cat that has ingested **antifreeze 6 hours ago?**

Activated charcoal and gastric lavage	HIDE
4-methylpyrazole	HIDE
20% Ethanol IV	HIDE
Pralidoxime chloride	HIDE
Thiamine and pyridoxine	HIDE

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Correct: 20% Ethanol IV

More than 3 hours after ingestion, ethanol is the treatment of choice for cats with ethylene glycol toxicity.

Recent clinical trials suggest that fomepizole (4-methylpyrazole, 4-MP) can be a more effective treatment than ethanol in cats when administered:

- at high doses (extra-label) and
- within 3 hours of ingestion of ethylene glycol (EG)

The prognosis for animals with evidence of acute renal failure (oliguria, azotemia) is guarded to poor. In those patients, there is little benefit to inhibiting alcohol dehydrogenase because there has already been metabolism of almost all of the EG. Their treatment would focus on diuresis (if possible) and correction of fluid, electrolyte, and acid-base disorders.

- Activate
- 4-methy
- 20% Et
- Pralidox
- Thiamine and pyridoxine

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41	42	43	44	45	46	47	48	49	50
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Aflatoxins are primarily associated with which clinical signs?

Leukoencephalomalacia, hypertension	HIDE
Icterus, hemorrhages	HIDE
Estrogenism, vulvovaginitis	HIDE
Lameness, hyperthermia	HIDE
Salivation, vomiting	HIDE

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41 **Correct:**
Icterus and hemorrhages.

Aflatoxin **Aflatoxicosis** is caused by toxigenic strains of **Aspergillus** (*A. flavus*, *A. parasiticus*) on peanuts, soybeans, corn (maize) and other cereal grains. The **liver is the major target organ**, with widespread hemorrhages, icterus and death in acute cases. Subacute outbreaks are more common, with nonspecific signs of anorexia, weakness, unthriftiness and sudden death.

Icterus, Think of **lameness and hyperthermia in cattle and horses with fescue lameness**, due to a toxin produced by an ergot-like mold (*Neotyphodium coenophialum*) on tall fescue grass.

Leukoer
 Estroger
 Lamene
 Salivation, vomiting

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41

- Aflatoxin
- Leukoer
- Icterus,
- Estroger
- Lamene
- Salivation, vomiting

fescue grass.

Slaframine toxicosis causes profuse salivation, primarily in horses and occasionally in cattle. Due to the fungus *Rhizoctonia leguminicola* (black patch disease) on red clover (*Trifolium pratense*) especially in wet, cool years.

Fumonisin is another *Fusarium* spp. mycotoxin associated with moldy corn. In equids, look for CNS disease (equine leukoencephalomalacia). In pigs, see hypertension and pulmonary edema (porcine pulmonary edema-PPE).

Click here to see a table of Mycotoxinoses in Domestic Animals.

The Merck Veterinary Manual online edition.

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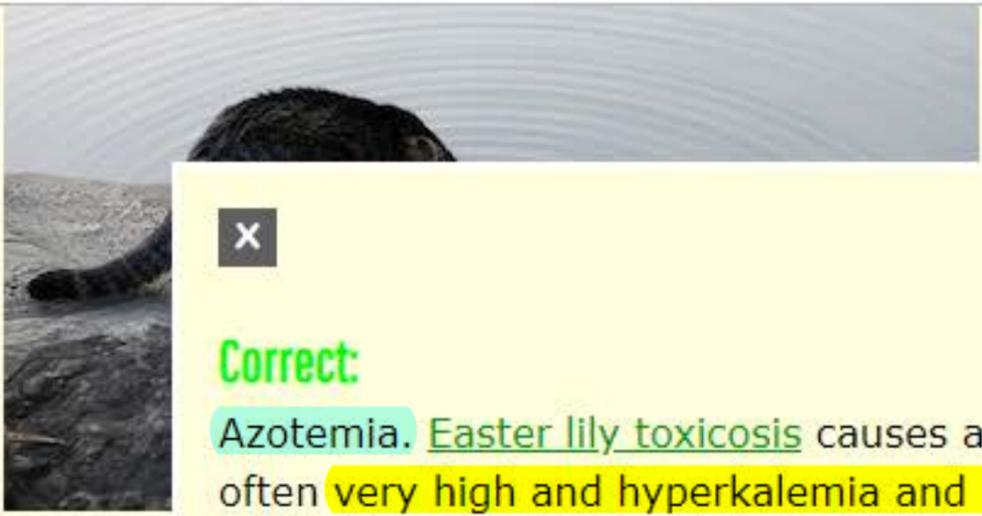
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A large cat is presented with lethargy, vomiting, polydipsia and polyuria. The owner recalls that the cat was chewing on an Easter lily three days earlier.

Which one of the following findings is most likely to turn up on routine labwork?



Azotemia	HIDE
Hemolytic anemia	HIDE
Hypocalcemia	HIDE
Elevated GGT	HIDE
Hypokalemia	HIDE



Correct:

Azotemia. [Easter lily toxicosis](#) causes acute renal failure in cats. The creatinine is often very high and hyperkalemia and hyperphosphatemia are frequently observed.

The prognosis is very poor for a cat showing signs of renal failure.

Refs: Cote, Clinical Veterinary Advisor-Dogs and Cats, 3rd ed. pp. 598-9 and the Merck Veterinary Manual online edition. Image courtesy, [Caspian blue](#).

- Azotemi
- Hemolyt
- Hypocal
- Elevated**
- Hypokal

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What **drugs** would be **used** to **treat** a dog with **organophosphate toxicity**?

- Methocarbamol, Midazolam, Dobutamine HIDE
- Diazepam, Atropine, Pralidoxime chloride HIDE
- Pentobarbital, Acepromazine, Methocarbamol HIDE
- Activated charcoal, Naloxone, Acepromazine HIDE
- Pentobarbital, Prazosin hydrochloride, Naloxone HIDE

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What dru

Methoca

Diazepa

Pentoba

Activate

Pentoba

Correct: Diazepam, Atropine, Pralidoxime chloride

Treatment for organophosphate (OPP) toxicity includes seizure control (diazepam, phenobarbital or pentobarbital), Pralidoxime chloride (2-PAM) and Atropine.

Organophosphate (OPP) toxicity, is common; Can present with hypersalivation, vomiting, diarrhea, MIOSIS, ataxia, depression, seizures and hyperthermia.

Remember that Carbamate toxicity looks similar to OPP tox

Methocarbamol (Robaxin-V ®) is the Rx of choice to treat Permethrin toxicity in cats

For a summary of toxicities, see the Zuku Review Top 20 Tox notes.

Refs: Plumb's Veterinary Drug Handbook, 7th ed. pp. 1131-3, Blackwell's 5-Min Vet

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Which toxic plant is associated with high mountain disease in cattle?

Water hemlock (<i>Cicuta</i>)	HIDE
Larkspur (<i>Delphinium</i>)	HIDE
Locoweed (<i>Astragalus</i>)	HIDE
False hellebore (<i>Veratrum</i>)	HIDE
Horsebrush (<i>Tetradymia</i>)	HIDE

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Correct:

Remember **LOCOWEED** (*Astragalus* and *Oxytropis*) ingestion worsens disease (due to swainsonine toxin). See marked increase in prevalence and severity of congestive heart failure (CHF) due to high altitude.

Condition develops quicker (1-2 wk) and incidence can be 100% when associated with ingestion of swainsonine. Locoweed toxin excreted in milk can cause CHF in nursing calves.

High mountain disease is essentially **right** heart CHF due to pulmonary hypertension from low O₂. Causes pulmonary vasoconstriction, so right ventricle is overworked, leading to CHF. MEMORY AID - "LOCOWeed makes cows HIGH" (altitude sick).

Water hemlock (*Cicuta*) causes rapid onset convulsions, coma, death (remember Socrates?).

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- Which to
- Water h
- Larkspu
- Locowee
- False he
- Horsebra

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Which to

Water h

Larkspu

Locowee

False he

Horsebrush (tetradymia)

Horsebrush (tetradymia) causes **photosensitization**, hepatic damage, **"bighead."**

Larkspur (*Delphinium*) contains alkaloids causing nonspecific toxicity signs - falling, bloat, salivation, constipation.

False hellebore (*Veratrum*) contains steroidal alkaloids. See vomiting, salivation, cardiac arrhythmia, bradycardia, dyspnea, muscle weakness, paralysis, coma. See congenital cyclops in lambs from ewes exposed to *Veratrum californicum*.

Follow this link to a Merck table with [images of toxic range plants](#).

Refs: Osweiler's NVMS Toxicology p. 367, Pasquini's Guide to Bovine Clinics, 4th ed. pp. 79-82 and the Merck Veterinary Manual online edition.

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A calf from a group of sick calves and young heifers on a Spring pasture is presented for necropsy. Several affected animals are weak, off-feed and have black tarry feces. The calf died this morning.

Necropsy reveals icterus, pale swollen kidneys and a gelatinous peri-renal edema. What should the owner be instructed to do?

Remove oak trees, acorns from the pasture	HIDE
Eliminate bracken fern from the pasture	HIDE
Need to supplement diet with copper, molybdenum	HIDE
Treat with high-dose penicillin for contagious bovine pyelonephritis	HIDE
Treat the water pond for blue green algae	HIDE

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A calf from necropsy died this

Necropsy should th

Remove

Eliminat

Correct: Remove oak trees, acorns from the pasture

Remove oak trees and acorns from the pasture. Think of oak poisoning in pastured calves when you see dead calves with peri-renal edema. Check the pasture for oak trees.

In Spring, buds, leaves and sprouting acorns contain nephrotoxic, hepatotoxic tannins. In the Fall, acorns on the ground are often the culprit.

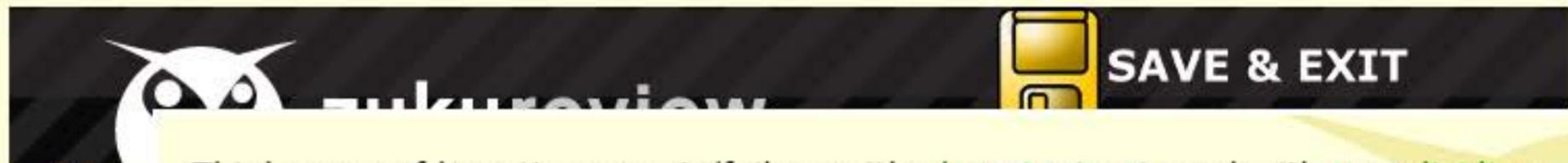
Check the rumen contents for leaves and acorns on necropsy. DDX includes pigweed (*Amaranthus* spp) poisoning and aminoglycoside antibiotic poisoning.

Think more of hepatic necrosis/failure with algae toxicosis and with pyrrolizidine alkaloidosis (*Senecio*, *Crotalaria*).

Need to supplement diet with copper, molybdenum	HIDE
Treat with high-dose penicillin for contagious bovine pyelonephritis	HIDE
Treat the water pond for blue green algae	HIDE

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A calf from necropsy died this

Necropsy should th

Remove

Eliminat

Think more of hepatic necrosis/failure with [algae toxicosis](#) and with [pyrrolizidine alkaloidosis](#) (*Senecio*, *Crotalaria*).

[Bracken fern toxicity](#) is more associated in cattle with bladder tumors, hematuria and aplastic anemia. In horses, look for thiamine deficiency due to thiaminase activity in the ferns.

[Contagious bovine pyelonephritis](#) is seen sporadically in post-partum cows, not calves.

Refs: Pasquini's Guide to Bovine Clinics, 4^{ed}. p. 234, Osweiler's NVMS Toxicology pp. 389-10 and the Merck Veterinary Manual online edition.

Need to supplement diet with copper, molybdenum	HIDE
Treat with high-dose penicillin for contagious bovine pyelonephritis	HIDE
Treat the water pond for blue green algae	HIDE

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A 3-year-old male neutered domestic shorthair cat is presented with a 2-hour history of rapid onset vomiting, salivation, depression, abdominal pain and dyspnea.

The cat's head and feet are swollen; mucous membranes are dark and cyanotic. He urinates dark brown urine onto the exam table.

What condition is at the top of the differential diagnosis list?

Hemobartonellosis	HIDE
Immune-mediated Hemolytic anemia (IMHA)	HIDE
Immune-mediated Thrombocytopenia (IMTP)	HIDE
Acetaminophen toxicity	HIDE
Anticoagulant rodenticide toxicity	HIDE

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Correct:

A 3-year rapid onset of dark brown urine. The cat's dark brown urine. What color is the urine?

This is the classic picture of feline **Acetaminophen toxicity** in a cat. Owner will almost always say they gave cat "Tylenol or acetaminophen".

See **methemoglobinuria** (brown urine), **methemoglobinemia** (brown blood), **Heinz body anemia**.

Most common cat toxicity. Occasionally in dogs.

Immune-mediated Hemolytic anemia (IMHA) is the most **common hemolytic anemia** in **dogs**, but **RARE in cats**. Look for **pale mucous membranes**, vague signs of weakness, depression or acute exercise intolerance, tachypnea, fever +/- icterus.

Acetaminophen toxicity

Anticoagulant rodenticide toxicity HIDE

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See methemoglobinuria (brown urine), methemoglobinemia (brown blood), [Heinz body anemia](#).

A 3-year rapid onset

The cat's dark brown

What color

Most common cat toxicity. Occasionally in dogs.

Immune-mediated Hemolytic anemia (IMHA) is the most common hemolytic anemia in dogs, but RARE in cats. Look for pale mucous membranes, vague signs of weakness, depression or acute exercise intolerance, tachypnea, fever +/- icterus.

See an **acute hemorrhagic** presentation with [Immune-mediated Thrombocytopenia \(IMTP\)](#) and [Anticoagulant rodenticide toxicity](#).

[Hemobartonellosis](#) presents with **general signs**: lethargy, weakness, anorexia, depression.

Acetaminophen

Anticoagulant rodenticide toxicity HIDE

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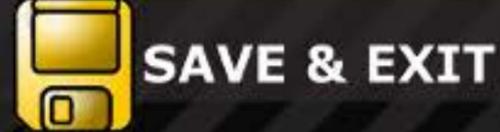
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Cattle are much more sensitive than horses to intoxication with which of the following?

Zinc	HIDE
Bracken fern	HIDE
Ionophores	HIDE
Fluoride	HIDE
Cyanide	HIDE

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Correct

Ruminants are more sensitive than monogastric animals to cyanide poisoning. The most frequent cause is ingestion of plants containing cyanogenic glycosides.

Horses are much more sensitive than ruminants to intoxication with ionophores than cattle.

Bracken fern poisoning manifests in different ways in ruminants and monogastric animals but is toxic to both.

Sheep are the most sensitive animals to copper toxicity. The maximum tolerable level of dietary copper is 25 ppm, 100 ppm, and 800 ppm for sheep, cattle, and horses, respectively.

Monogastric animals are less sensitive to the neural and hepatic toxins of blue-green algae than are ruminants.



41

Cattle ar

Zinc

Bracken

Ionophc

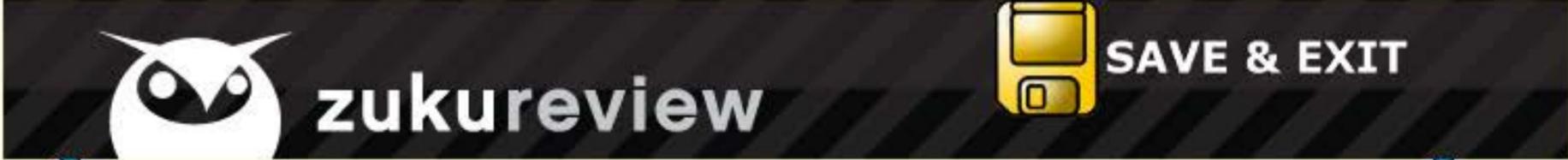
Fluoride

Cyanide

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An unweaned 2-month old calf is presented for necropsy.

The calf collapsed and suddenly died after she escaped and was chased around the back pasture for 45 minutes by her owner.

Among other things, white myocardial and endocardial streaking in the left ventricle of this calf's heart are evident.

What advice should be given the farmer?

Put all the calves off ionophore-containing feed	HIDE
Check the mother for bovine leukosis by AGID	HIDE
Search the calf barn for sources of lead	HIDE
Treat the other calves with vitamin E/Selenium	HIDE
Start the other calves on Ceftiofur (Naxcel®)	HIDE

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41 ✓ 42 M ✗ 43 ✓ 44 ✓ 45 ✓ 46 ✓ 47 ✗ 48 M ✓ 49 50

Correct:

An unwe **Treat the other calves with vitamin E/Selenium.**

The calf Think of **white muscle disease** when you see SUDDEN DEATH and endocardial
pasture t PLAQUES in a young calf, lamb or kid with a history of recent VIGOROUS EXERCISE.

Among c Follow this link to a **Merck image of pale ventricular myocardium.**
calf's he: Typically seen in young, fast-growing animals (ie: calves 2 weeks-6 mos).

What ad: Clinical signs may include dyspnea (due to myocardial disease), stiff gait, arched
back, weakness, recumbent but BAR (bright, alert, responsive).

Search t Sudden death may resemble **enterotoxemia**, should see acute bloody diarrhea,
Treat th convulsions, opisthotonos in first days of life with enterotoxemia.

Put all t

Check the mother for bovine leukosis by AGID	HIDE
Start the other calves on Ceftiofur (Naxcel®)	HIDE

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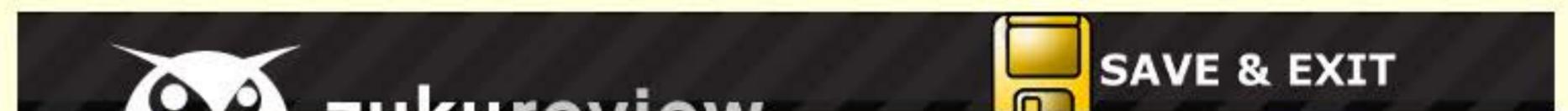
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Which choice best describes how **anticoagulant** rodenticides cause hypocoaguability?

Calcium becomes protein-bound, inhibiting clotting cascade	HIDE
Platelet destruction	HIDE
Vitamin K1 inhibition	HIDE
Acute liver failure causes decreased synthesis of clotting factors	HIDE
Failure of von Willebrand factor	HIDE

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Anticoagulant rodenticides inhibit the action of the enzyme vitamin K1 (vit K1) reductase.

Without this enzyme, Vit K1 epoxide (inactive form) cannot be recycled into vit K1 (active form).

Vit K1 is necessary for the formation of clotting factors II, VII, IX and X (vit K-dependent clotting factors).

Factor VII (part of extrinsic pathway) has the shortest half-life.

Prothombin time (PT) will be prolonged before activated partial thromboplastin time (PTT).

Anticoagulant rodenticide Rx: Decontamination, vitamin K1, +/- blood/plasma transfusions (if patient is hemorrhaging).

Failure of von Willebrand factor

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A client calls to discuss her mature, indoor, male neutered cat's diet. She saw something online about benefits of feeding him fresh fishmeal instead of commercial cat food.

What is a key point to communicate?

It is high in Vitamin A, which can be dangerous	HIDE
Would likely need to supplement phosphorous and magnesium	HIDE
It is potentially toxic and allergenic	HIDE
Fish is a good protein source for cats	HIDE
Would be deficient in thiamine	HIDE

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41

Correct: It is potentially toxic and allergenic

Fishmeal is potentially toxic and allergenic. Typically produced from fish that are unfit for human consumption.

Ethoxyquin, a preservative often found in fishmeal may have toxic hepatic effects and may act as a carcinogen.

Fish can be allergenic, leading to increased risk of feline asthma or atopic dermatitis. Can contain high levels of mercury. Mercury can lead to neurological disturbances.

Fish can contain high concentrations of calcium and phosphorous.

Fish is not actually deficient in thiamine. In fact, raw freshwater fish may contain high

A client online at

What is

It is high

Would it

It is pot

Fish is a good protein source for cats	HIDE
Would be deficient in thiamine	HIDE

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41

Fish can contain high concentrations of calcium and phosphorous.

Fish is not actually deficient in thiamine. In fact, raw freshwater fish may contain high levels of thiamine antagonists, which can cause deficiency by quickly decreasing thiamine in the diet.

Cats require more vitamin A in their diets than do other mammals because they cannot convert beta carotene into vitamin A.

Refs: Dorea (2006), "Fish meal in animal feed and human exposure to persistent bioaccumulative and toxic substances," The US FDA, and the Merck Vet Manual online.

A client online at

What is

It is high

Would it

It is pot

Fish is a good protein source for cats	HIDE
Would be deficient in thiamine	HIDE

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What findings might be expected from a necropsy of a sheep that has died of copper toxicity?

Gun-metal grey kidneys, port wine-colored urine	HIDE
Pulmonary edema, ascites	HIDE
Few, if any, gross tissue changes	HIDE
Cerebrocortical necrosis visible under UV light	HIDE
Pale myocardium, rhabdomyolysis	HIDE

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What fin toxicity?

Gun-me

Pulmona

Few, if a

Cerebro

Correct:

The phrase "gun-metal gray kidneys and port-wine colored urine" is like shouting "copper toxicity and hemolytic crisis!" Look for a severe gastroenteritis, icterus, depression, weakness, shock.

White muscle disease: look for sudden death in a young calf with pale myocardium.

Arsenic can produce severe GI signs, including a hemorrhagic diarrhea, but not the gunmetal kidneys or hemolytic signs.

Cattle find arsenic on pesticide-contaminated foliage. Pets find arsenic in ant baits and in pressure treated wood (like on backyard decks) or wood preservative.

Lead poisoning causes more CNS signs (encephalopathy, blindness), but can see diarrhea or constipation with few disease-specific gross pathologic changes.

Pale myocardium, rhabdomyolysis HIDE

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Ingestion of corn contaminated with the fungus *Fusarium moniliforme* primarily leads to damage of which equine organs?

Liver and brain	HIDE
Spleen and liver	HIDE
Pituitary and adrenal glands	HIDE
Kidney and lung	HIDE
Bladder and kidney	HIDE

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Correct:

Liver and brain. Horses that ingest corn contaminated with the fungus *Fusarium moniliforme* can develop liquefactive necrosis and degeneration of the cerebrum as well as hepatic congestion and necrosis.

Ingestion damage

Liver and

A variety of neurologic signs can be displayed, including somnolence, ataxia, head pressing, mania, blindness, and seizures, in addition to icterus and petechiation of the mucous membranes.

Spleen &

Refs: Smith, Large Animal Internal Medicine, 4th ed., pp. 1037-8 and the Merck Veterinary Manual online edition.

Pituitary

Kidney &

Bladder and kidney

HIDE

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Which two chemicals are associated with mothball toxicity?

Paradichlorobenzene, naphthalene	HIDE
Trichothecenes, zealaraone	HIDE
4-Ipomeanol, paraquat (dichloride)	HIDE
Pentachlorophenol, fumonisin B1	HIDE
Acetochlor, atrazine	HIDE

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Which ty

Paradich

Trichoth

4-Ipome

Pentach

Acetoch

Correct: Paradichlorobenzene, naphthalene

Mothball toxicity may be caused by old-fashioned naphthalene-containing mothballs or from paradichlorobenzene-containing cakes, found in deodorizer cakes in diaper buckets, garbage cans and in bathrooms.

Typically a problem of dogs, ingestion of a single mothball can be toxic for a 30 pound (14 kg) dog, causing GI signs and after 24-48 hours, hemolytic anemia and heinz bodies (precipitated hemoglobin due to oxidant injury).

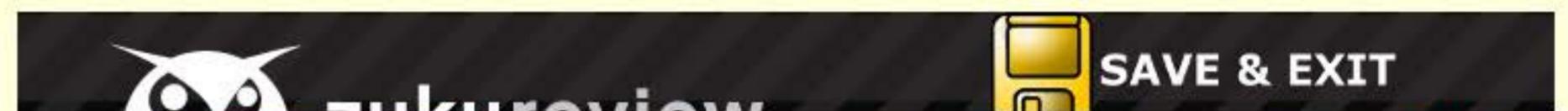
Paradichlorobenzene is an organochlorine insecticide, mainly affecting the CNS. Animals present with tremors, salivation, ataxia and seizures.

Pentachlorophenol, paraquat (dichloride), acetochlor and atrazine are all toxic herbicides.

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Pentachlorophenol, paraquat (dichloride), acetochlor and atrazine are all toxic herbicides.

51 ✓ 4-Ipomeanol (moldy sweet potato), fumonisin B1, trichothecenes and zealaraone (moldy corn) are all fungal toxins.

Which two signs of moldy sweet potato poisoning (4-Ipomeanol) are indistinguishable from acute bovine pulmonary emphysema and edema (ABPEE, Fog fever), a relatively common cause of acute respiratory distress in cows, especially adult beef cattle.

Paradichlorobenzene

Trichothecenes

4-Ipomeanol

Pentachlorophenol

Acetochlor, atrazine

Refs: Cote, Clinical Veterinary Advisor-Dogs and Cats, 3rd ed. Mothball Toxicosis (online) and the Merck Veterinary Manual online edition.

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A 3-year-old neutered male Redbone hound with a 1-day history of vomiting, diarrhea and increased drinking and urination presented at a practice in Minnesota.

He is an outdoor hunting dog, free to roam the rural lakeside area where the family lives, surrounded by several cabins and rustic camps.
rural

The dog is well-cared for, up to date on vaccines, and in good body condition. The owner is worried about rabies because "he started drooling a lot last night and stumbling around."

This morning the dog had a seizure, and is no longer urinating. The dog is lethargic and depressed.

Upon physical exam dehydration and several ulcers around his mouth are noted. He is tender on caudal abdominal palpation.

What condition is at the top of the differential Dx list?

Value	Normal
T=100.5 F (38.1 C)	99.5-102.5 F, 37.2-39.2 C
HR=80 bpm	60-120
RR=40 brpm	15-34

worried about rabies because "he started drooling a lot last night and stumbling around."

This morning the dog had a seizure, and is no longer urinating. The dog is lethargic and depressed.

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Value	Normal
T=100.5 F (38.1 C)	99.5-102.5 F, 37.2-39.2 C
HR=80 bpm	60-120
RR=40 brpm	15-34

Idiopathic epilepsy	HIDE
Anticoagulant rodenticide toxicity	HIDE
Rabies, dumb form	HIDE
Ethylene glycol (antifreeze) toxicity	HIDE
Leptospirosis	HIDE

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What condition is at the top of the differential Dx list?

Value	Normal
T=100.5 C)	
HR=80 l	
RR=40 l	
Idiopath	
Anticoag	
Rabies,	
Ethylene	
Leptosp	

The preferred answer is Ethylene glycol (antifreeze) toxicity.

The acute onset, oral ulcers, vomiting/diarrhea and neurological signs suggest toxicity. In combination with renal signs (PU/PD followed by anuria, dehydration) you should be thinking about antifreeze.

Although rabies should always be on your DDX for an animal presenting with neurologic signs (seizures), Hx of vaccination makes this less of a concern.

Owners of rustic camps in the North East US sometimes fill their toilet bowls with antifreeze over the cold winters to protect the lines from freezing while no one is there.

Frequently in the Spring a dog may get into one of these camps and drink the sweet-tasting antifreeze.

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Eastern tent caterpillars have been associated with which disease?

Prolonged gestation associated with fetal deformity	HIDE
Ulcerative posthitis and vulvitis	HIDE
Postpartum dysgalactia syndrome of swine	HIDE
Mare reproductive loss syndrome	HIDE
Contagious agalactia of sheep	HIDE

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Eastern t

Prolonge

Ulcerati

Postpart

Mare re

Contagious agalactia of sheep

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Correct:

Mare reproductive loss syndrome (MRLS) is poorly understood, but has been associated with wild cherry trees, Eastern tent caterpillars and weather changes that affect pasture conditions.

Click here to see Eastern tent caterpillars and a wild cherry tree, Prunus avium.

Refs: Dwyer, etal., *Case-control study of factors associated with early fetal losses associated with mare reproductive loss syndrome in central Kentucky during 2001* , JAVMA, Vol 222, No. 5, March 1, 2003 and the Merck Veterinary Manual online edition.

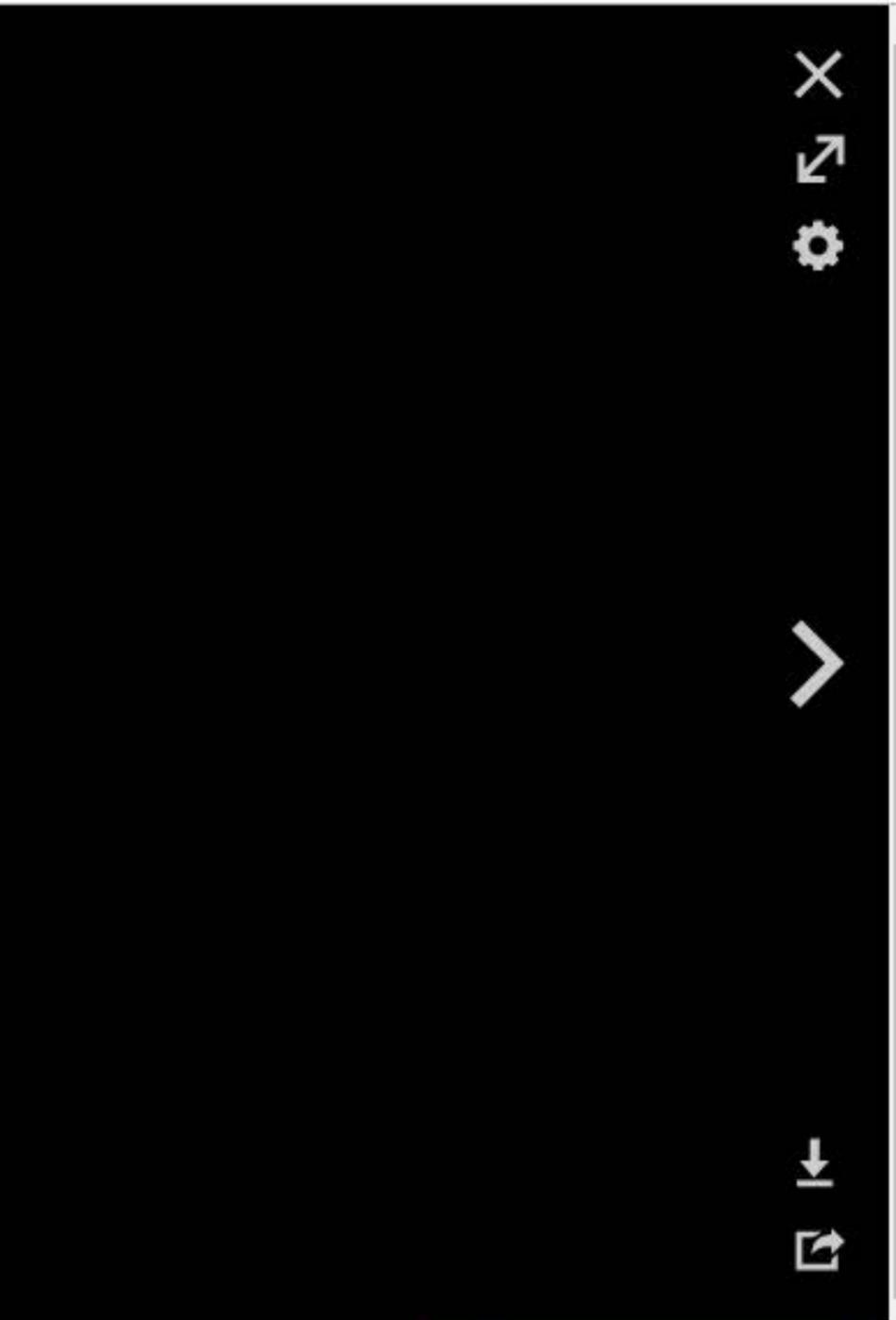


Eastern tent caterpillar on bark - single - USFS

More details

[View author information](#)

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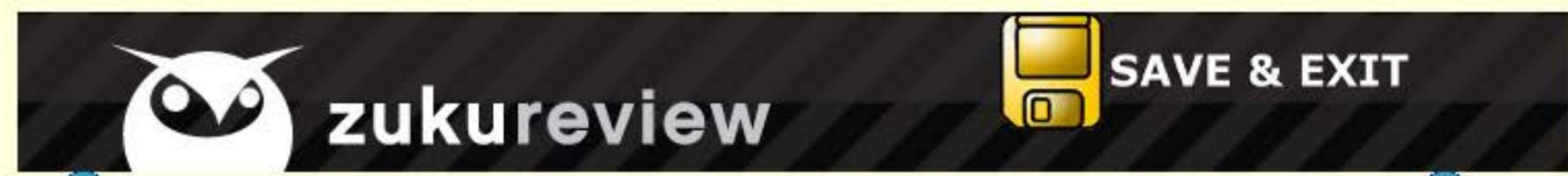


Prunus avium fruit; Northumberland, UK; 14 August 2006

 **More details**

No machine-readable author provided. MPF assumed (based on copyright claims). - No machine-readable source provided. Own work

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IMAGE OF THE DAY: [aural abcess turtle](#)

Where would a dog or cat be likely to encounter arsenic around the house?

Snail killer	HIDE
De-icer crystals	HIDE
Silver-polish	HIDE
Ant baits	HIDE
Anti-mildew paint	HIDE

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- Snail kil
- De-icer
- Silver-p

Correct:
 Ant baits contain inorganic arsenic and are sometimes eaten by pets, especially cats. Expect GI presentation- Vomiting, diarrhea, hematochezia, weakness, prostration.
 The **treatment** of choice for arsenic toxicity is **SUCCIMER** (dimercaptosuccinic acid (DMSA)).
 This drug is administered **orally** (or **per rectum** in vomiting animals) for **10 days**.
 See **arsenic in wood preservatives** (ie: pressure-treated lumber) and in **thiacetarsemide**, a **heartworm** adulticide, now superceded by the safer and more effective **melarsomine dihydrochloride**.
 Refs: Cote, Clinical Veterinary Advisor-Dogs and Cats online edition, Plumb's Vet

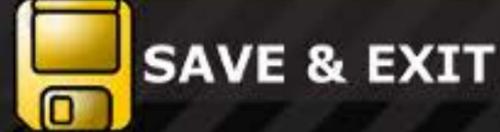
Ant baits	HIDE
Anti-mildew paint	HIDE

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zukureview



PREV <

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51 ✓	52 ✓	53 ✓	54 ✓	55 ✗	56 ✗	57	58	59	60
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Which of the following choices is less toxic to goats than it is to sheep?

Nightshades	HIDE
Molybdenum	HIDE
Tetracyclines	HIDE
Pigweed	HIDE
Copper	HIDE

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Correct:

Goats are less susceptible to copper toxicosis than sheep, because they apparently excrete copper more efficiently.

Which of

When fed at toxic levels, copper accumulates chronically in the liver until it is suddenly released under conditions of stress, leading to an acute hemolytic crisis.

Nightsh

Classic lesions found in animals with copper toxicity include dark, gun metal-colored kidneys, resulting from hemoglobinuria, jaundice, port-wine-colored urine, and an enlarged spleen with dark brown-black parenchyma.

Molybde

Tetracyc

Follow this link to see a good review of copper toxicity in sheep complete with images, courtesy of NADIS, an excellent web resource from the U.K.

Pigweed

Copper

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Which toxic plant has been associated with stringhalt in horses?

<i>Lathyrus</i> spp. (sweet pea)	HIDE
<i>Nerium oleander</i> (oleander)	HIDE
<i>Eupatorium rugosum</i> (white snakeroot)	HIDE
<i>Pteridium aquilinum</i> (bracken fern)	HIDE
<i>Quercus</i> spp. (oak)	HIDE

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PREV

51

Which to

- Lathyrus
- Nerium
- Eupator
- Pteridiu
- Quercus spp. (oak)

Correct: Lathyrus spp. (sweet pea)

Potential toxic causes of **stringhalt** include *Hypochoeris radicata* (flatweed) and *Lathyrus spp.* (sweet pea).

Stringhalt is a gait abnormality characterized by spasmodic overflexion of the hind limbs. The cause may be related to a peripheral neuropathy.

Quercus spp. (oak) contain tannins that can cause gastroenteritis, renal disease, liver damage, and death.

Eupatorium rugosum (white snakeroot) contains **tremetols** that cause cardiac and skeletal muscle damage.

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PREV

51

Which to

Lathyrus

Nerium

Eupator

Pteridiu

Quercus

Nerium oleander (oleander) contains **glycosides** that are **cardiotoxic** and **gastrointestinal irritants**.

Pteridium aquilinum causes **bracken fern toxicity** via thiaminases that cause weight loss, ataxia, lethargy, tremors, recumbency and ultimately, death in horses.

In ruminants, see aplastic anemia and hematuria.

Click here for a table of [North American poisonous plants](#).

Refs: Smith, Large Animal Internal Medicine, 3rd ed. pp. 1011-2, 1620-3 and the Merck Veterinary Manual online edition.

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What clinical signs are associated with toxicity due to ingestion of the plant in this image?

[Click here to see image](#)

Gastric ulcers, colic, hematochezia	HIDE
Hemorrhages, hematuria	HIDE
Abortions, congenital defects in newborns, infertility	HIDE
Posterior incoordination, urinary incontinence	HIDE
Icterus, anorexia, seizures, death	HIDE

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LOCATION(S) • [Range Plants of Temperate North America](#)

Sorghum vulgare (Sorghum, Sudan grass, Kafir, Durra, Milo, Broom-corn, Schrock, etc)

photo size: [small](#) | [high](#)



Sorghum vulgare (Sorghum, Sudan grass, Kafir, Durra, Milo, Broom-corn, Schrock, etc).

Courtesy of Dr. Cecil Brownie.



PREV

51

What clin
[Click here](#)

- Gastric
- Hemorr
- Abortio
- Posterior
- Icterus, anorexia, seizures, death

Correct: Posterior incoordination, urinary incontinence

Sorghum (Sudan grass, Johnson grass, Milo) can cause a neurologic toxicity, primarily in horses.

Look for signs of **posterior incoordination** (swaying rear limb gait, knuckling) and urinary incontinence, secondary to a lower motor neuron myelomalacia of the nerve roots.

Sorghums also cause cyanide toxicity.

Click here to see a Table of toxic range plants in North America.

Refs: Pasquini's Guide to Eq Clin, 3rd ed. p.156, Pasquini's Guide to Bov Clin, 4th ed.

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51 ✓	52 ✓	53 ✓	54 ✓	55 ✗	56 ✗	57 ✗	58 ✓	59 ✗	60
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What is one cause of abdominal fat necrosis (lipomatosis) in cattle?

Grazing tall fescue	HIDE
Aflatoxicosis	HIDE
Pregnancy toxemia	HIDE
Chronic excess protein in ration	HIDE
Fatty liver disease	HIDE

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FINISH

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PREV

51

What is c

Grazing

Aflatoxic

Pregnan

Chronic

Fatty liver disease

Correct: Grazing tall fescue

One cause of abdominal fat necrosis (lipomatosis) in adult cattle (and some deer) is prolonged grazing of tall fescue infected with Neotyphodium coenophialum.

Seen throughout the USA where tall fescue is the primary pasture grass. Over 90% of such pastures are infected with the endophyte. There are some new varieties that are non toxic.

Even without fescue exposure, hard masses of necrotic fat are relatively common in adult cattle.

On rectal exam, the masses feel like "floating corks" similar to cotyledons, and may be mistaken for a developing pregnant uterus.

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What is c

Grazing

Aflatoxic

Pregnan

Chronic

Fatty liver disease

be mistaken for a developing pregnant uterus.

Remember the other fescue-related problem, [fescue mycotoxins](#), which can cause lameness and hyperthermia in cattle and horses due to an ergot-like mold on tall fescue grass.

[Fatty liver disease](#) in cattle is a complex metabolic imbalance that can occur when an overconditioned cow reduces feed intake.

Most common in periparturient cattle (think of fat cows at calving).

Refs: Pasquini's Guide to Bov Clin, 4th ed. p. 32 and the Merck Veterinary Manual online edition.

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FINISH





1 2 3 4 5 6

What is a common source of zinc toxicity in pet birds?

Paint in old homes	HIDE
Stained glass solder	HIDE
Galvanized wire cage	HIDE
Diets with more than 12% wheat	HIDE
U.S. penny	HIDE

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Correct: Galvanized wire cage

1

Lead and zinc toxicity are two of the most common toxicities of caged birds. Sources of zinc include galvanized cage wire, or other metals coated with shiny metal to prevent rusting.

What is a

Sources of lead for caged birds include paint in old houses, lead curtain weights or in stained glass, lead solder.

Diets wi

In dogs, think of Zinc toxicosis associated with ingestion of U.S. Lincoln pennies. All pennies minted since 1984 (and a few in 1983), are 97.5% zinc by weight.

U.S. per

Galvaniz

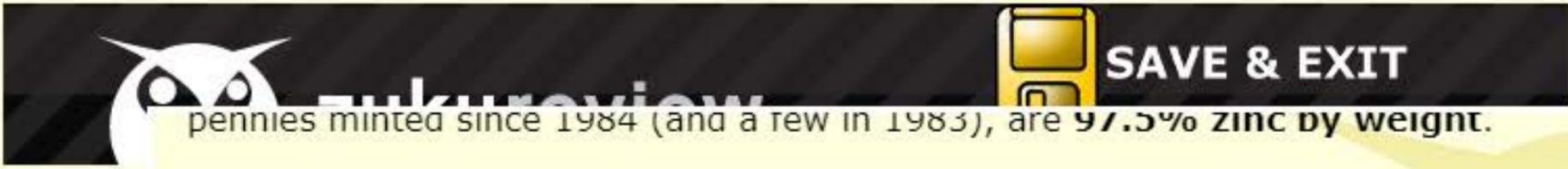
Other sources of zinc include batteries, car parts, paint, zinc-oxide sunscreen creams, zippers, board-game pieces, screws and nuts on pet carriers, and the coating on galvanized metals like plumbing pipes and some cookware.

Stained

Paint in

NEXT





pennies minted since 1984 (and a few in 1983), are 97.5% zinc by weight.



Other sources of zinc include batteries, car parts, paint, zinc-oxide sunscreen creams, zippers, board-game pieces, screws and nuts on pet carriers, and the coating on galvanized metals like plumbing pipes and some cookware.

Click here to see a [radiograph of a dog who ate a penny](#).

In pigs, zinc deficiency is called [parakeratosis](#). Follow this link to [see severe parakeratosis](#).

Refs: Osweiler's Toxicology, NVMS, pp. 204-5 and the Merck Veterinary Manual online edition.

- What is a
- Diets wi
- U.S. per
- Galvaniz
- Stained
- Paint in

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Progress bar with 6 slots, slot 1 is green with a checkmark, slot 2 is grey.

"Bovine Bonkers" is another name for what condition?

Ammoniated feed toxicity	HIDE
Polioencephalomalacia	HIDE
Thromboembolic meningoencephalitis (TEME)	HIDE
Pseudorabies	HIDE
Hypomagnesemic tetany	HIDE

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English (United States) US keyboard To switch input methods, press Windows key+Space.



1

Correct:

"Bovine bonkers" is a common name for ammoniated feed toxicity. Look for acute, rapidly progressive disease characterized by muscle tremors on face/ears, progressing to hyperexcitability, stampeding, agitation, convulsions. May see severe colic, bloat (smell ammonia in rumen gas), dyspnea. May die within 2 hours.

"Bovine

Ammon

Associated with ammoniated HIGH-quality hay, silage, molasses, and protein blocks. Ammoniated LOW-quality forages are a relatively safe nitrogen source to acclimated animals.

Polioenc

Thromb

Pseudor

Ammoniated feed toxicity is related to nonprotein nitrogen (NPN)/ammonia poisoning with urea, urea phosphate, ammonia (anhydrous), and salts such as monoammonium and diammonium phosphate in feed.

Hypomagn

BACK

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1

"Bovine

Ammon

Polioenc

Thromb

Pseudor

Hypomagnesemic tetany

Hypomagnesemic tetany can present a lot like this with tetany and convulsions unto death. With pseudorabies see pruritus, salivation (DDX rabies), more a pig disease.

With polioencephalomalacia (PEM- low thiamine), look for pathognomonic "STAR-GAZING" (dorsomedial strabismus), depression, centrally blind, opisthotonus, head-pressing, ataxia.

With thromboembolic meningoencephalitis (TEME) due to *Haemophilus somnus*, look for a combination of: respiratory (cough, dyspnea), CNS (ataxia, depressed, blind, opisthotonus) and septic arthritis.

Refs: Pasquini's Guide to Bovine Clinics, 4th ed. pp. 204, 140-6, and the Merck Veterinary Manual online edition.

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Which of these is **safe for pets to eat?**

Avocados	HIDE
Macadamia nuts	HIDE
Pumpkin	HIDE
Bread dough	HIDE
Raisins/grapes	HIDE

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1 **Pumpkin.**

Avocado can cause **myocardial damage** in birds, fish and certain mammals. Dogs appear relatively resistant to the effects of avocado.

Raw bread dough made **with yeast** can cause **mechanical and biochemical hazards** when eaten. Think **dogs- gastric distention, metabolic acidosis, CNS depression.**

Dogs who eat **macadamia nuts** have been reported with a nonfatal syndrome of vomiting, ataxia, weakness, hyperthermia, depression.

Renal disease has been reported in some dogs after eating **raisins/grapes**. According to Merck, no one knows why some dogs can eat raisins with no problems, and other dogs get sick.

[Click here to see a list](#) of foods to avoid feeding to pets provided by the ASPCA

Raisins/grapes

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What is a common source of onion toxicity for cats?

Human baby food	HIDE
Chewable vitamin supplements	HIDE
Kung Pao chicken	HIDE
Semi-moist cat food	HIDE
Homeopathic flea treatments	HIDE

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1

Correct:

Baby food fed to cats is a potential source of onion or garlic toxicity. Look for a Heinz body anemia due to oxidative red cell damage. Cats may present lethargic, weak, with pale mucous membranes and brown urine (hemoglobinuria).

Human

Garlic and onion plants are in the Allium family and are commonly found growing wild in North America. Dogs who eat indiscriminately, both garbage and plants, can suffer the same toxicity as cats.

Chewab

Kung Pa

Semi-m

Refs: Cote, Clinical Veterinary Advisor-Dogs and Cats, 3rd ed. pp. 719-20 and the Merck Veterinary Manual online .

Homeopathic treatments

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1 ✓	2 ✓	3 ✗	4 ✓	5	6
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A 3-year-old male neutered domestic shorthair cat is presented with a 1-hour history of rapid onset salivation, depression, abdominal pain and dyspnea. He vomited once on the ride to the clinic. The owner reports treating the cat with acetaminophen 3 hours prior to presentation.

The cat's head and feet are swollen; mucous membranes are dark and cyanotic. He urinates dark brown urine onto the exam table.

What should be done next?

IV fluids; IV Dopamine (Inotropin®) IV	HIDE
Activated charcoal; IV 1% Methylene blue	HIDE
IV Dexamethasone; Cyclophosphamide (Cytoxan ®)	HIDE
Induce vomiting (Xylazine); Gastric lavage	HIDE
IV Na bicarbonate; N-acetylcysteine	HIDE

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1

Vomiting should be induced in recent exposures, even in a cat that vomited prior to arrival. Induce vomiting (with xylazine or dexmedetomidine) and gastric lavage (activated charcoal) are first priorities within 4 hours of ingestion of acetaminophen.

A 3-year rapid onset ride to the presenta

Generally speaking, vomiting should not be induced in a dyspneic patient. However, this is a case of known acetaminophen toxicity and early decontamination is critical to survival.

The cat's dark bro

Also Rx with IV fluids, and N-acetylcysteine (Mucomyst ®), a sulfhydryl replacement drug that helps address methemoglobinemia.

What sho

Additional treatments include antioxidants such as S-adenosylmethionine and ascorbic acid (Vitamin C). Cimetidine may be useful in dogs to reduce the formation of toxic metabolites. Cimetidine is contraindicated in cats due to the potential increased production of toxic metabolites.

IV fluids

Activate

IV Dexamethasone; Cyclophosphamide (Cytosan ®)	HIDE
Induce vomiting (Xylazine); Gastric lavage	HIDE
IV Na bicarbonate; N-acetylcysteine	HIDE

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1 ✓

A 3-year rapid onset ride to the present

The cat's dark brown

What should

IV fluids

Activate

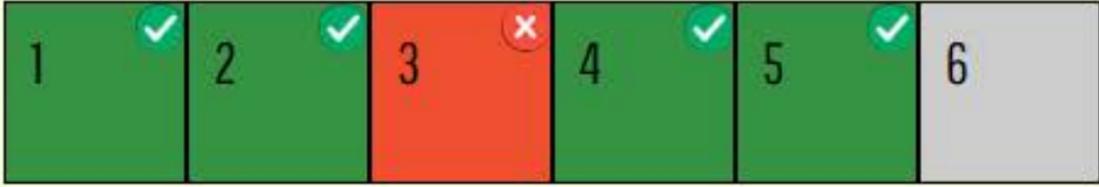
Must **MONITOR methemoglobin** percentage Q 2 to 3 hours, **liver enzymes** (ALT, ALP) Q 12 hours. If **methemoglobinemia concentration greater than 50% prognosis is GRAVE**. If see progressively rising liver enzymes 12 to 24 hours after ingestion, **SERIOUS CONCERN**. Clinical signs persist 18 to 24 hours after ingestion- Cat can die at ANY TIME from methemoglobinemia

As little as a quarter to half a tablet of **acetaminophen is toxic** to cats. Merck says **toxicity can be occur as low as 10-40 mg/kg**. Most common cat toxicity. Occasionally see in dogs.

Refs: Cote, Clinical Veterinary Advisor-Dogs and Cats, 3rd ed. pp. 12-13, Blackwell's 5-Minute Vet Consult Canine Feline, 4th ed. pp. 10-11, Pasquini's, Tschauner's Guide to Small Animal Clinics, vol 1, 2nd ed. p. 731, and the Merck Veterinary Manual online edition.

IV Dexamethasone; Cyclophosphamide (Cytosan ®)	HIDE
Induce vomiting (Xylazine); Gastric lavage	HIDE
IV Na bicarbonate; N-acetylcysteine	HIDE

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A three-year old neutered male indoor cat is presented with an acute onset of vomiting and tremors. The cat has a recent history of getting into the client's houseplants. On physical examination, the patient is lethargic and weak, ataxic, with abdominal pain.

Which one of the following is the most appropriate toxicologic diagnosis?

Philodendron	HIDE
Easter Lily	HIDE
Catnip	HIDE
Azalea	HIDE
Calla Lily	HIDE

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SAVE & EXIT

Correct

Easter or Tiger Lilies are very toxic to cats, causing acute vomiting, tremors, ataxia and abdominal pain. Fatal renal failure follows if left untreated.

1

Azaleas are very cardiotoxic, containing andromedotoxins (grayanotoxins) found in all parts of the plant, including the pollen and nectar. Within hours of ingestion of toxic dose (1 g/kg), can see signs.

A three-
tremors.
examina

Clinical signs tend to be GI and cardiac, include salivation, lacrimation, vomiting, diarrhea, dyspnea, convulsions, coma. Some clinical signs mimic digoxin toxicosis (bradycardia, shock, cardiac failure, death). Illness may last days.

Which or

- Philoder
- Easter L

Philodendrons and calla lilies contain excess calcium oxalate, toxic to the kidneys and to the oral tissues causing swelling and inflammation when ingested.

Catnip	HIDE
Azalea	HIDE
Calla Lily	HIDE

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