Liver Disease and Photosensitization

Plants causing liver disease and photosensitization (sensitivity to sunlight) are often grouped together, as photosensitization is often, but not always, a secondary symptom of liver disease caused by poisonous plants. As chlorophyll breaks down, it becomes phylloerythrin, a phototoxic compound. In healthy animals, the liver filters phylloerythrin from the blood, preventing any damage. If the liver is compromised by toxins, it is unable to remove the compound from the blood and photosensitization occurs. Some plants contain compounds that, once absorbed into the bloodstream, react to UV exposure, without any effect on the liver. Photosensitization resembles severe sunburn. Plants from a variety of families can impact liver health or cause related nutrient deficiencies. Photosensitization symptoms are most significant on white skinned animals or white skinned portions of animals, around the face, and near hooves.

| Common Pasture Plants Affecting the Liver and Blood and/or Causing Photosensitization |
|-----------------------------------------------|-----------------------------------------------|
| Alliums pp.                                   | Onion                                         |
| Descuriania sophia                            | Flixweed/Tansy mustard                        |
| Equisetum spp.                                | Horsetail and Scouring rush                   |
| Hypericum perforatum                          | St. Johnswort                                 |
| Pteridium aquilinum                           | Western bracken fern                          |
| Thermopsis rhombifolia                        | False lupine                                  |
| Tribulus terrestris                           | Puncture vine                                 |
| Trifolium spp.                                | Clover                                        |
| Vaccaria pyramidata                           | Cowcockle                                     |
| Xantium strunarium                            | Cocklebur                                     |

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway
Onion, *Allium spp.*

**Identification:** Narrow, linear, fleshy leaves; round stem; single bulb. White flowers in umbel borne on leafless flower stalk. Strong onion odor.

**Habitat:** Meadows, pastures

**Animals Affected:** Cattle are most susceptible, horses and dogs semi-susceptible; sheep and goats most resistant.

**Toxin family:** Alkaloids: damages red blood cell metabolism.

**Other:** Most poisonings are due to animals fed with cull domestic onions—rarely from wild onions. First sign of toxicity is generally dark red-brown urine, weak pulse, onion breath. Causes milk to taste like onion —onion flavor will disappear if animal is cut off from eating onions for 24 hours.
Flixweed/Tansy Mustard, *Descuriania sophia*

**Identification:** Up to two foot winter annual/biennial. Pubescent, alternate leaves two to three times pinnately compound, with linear segments. Flowers a raceme of tiny yellow flowers and fruit a long narrow pod, maturing from the bottom of the plant, up.

**Habitat:** Waste areas, roadsides and disturbed sites.

**Animals Affected:** Cattle

**Toxin Family:** Unknown

**Other:** Causes sporadic poisoning presenting as blindness and the loss of use of tongue and throat; or as liver disease and photosensitization.

**Identification:** Perennial with dimorphic stems. Vegetative stem has whorls of fine green jointed branches. Reproductive stem is flesh colored, unbranched, with a single cone at its tip

**Habitat:** Moist to wet forests, meadows, swamps, roadsides, areas with high water tables

**Animals Affected:** Primarily horses

**Toxin family:** Thiaminase; causes Vitamin B deficiency

**Other:** Symptoms include weight loss, diarrhea and weakness, leading to immobility and death. No loss of appetite. All plant parts are poisonous. Becomes increasingly toxic when dry, in hay

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway
St. Johnswort, *Hypericum perforatum*

**Identification:** One- to three-foot perennial. Erect stems, rust colored at base. Opposite, oblong leaves covered with transparent dots. Bright yellow flowers in cymes, often with black dots on petal edges.

**Habitat:** Pastures, rangeland, open timber, prefers well-drained soil.

**Animals Affected:** Cattle, sheep and horses.

**Toxin Family:** Hypericin (a photoreactive pigment) from the glandular dots on leaves is absorbed after ingestion, causing photosensitivity (skin cell death). Generally primarily affects white-skinned animals, rarely death occurs.

**Other:** Causes blisters around the mouth, eyes, ears, nose and feet when exposed to light. Young plants palatable, mature plants not as much. Toxic at all growth stages. Remains toxic in hay.

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway
Western Bracken Fern, *Pteridium aquilinum*

**Identification:** Perennial solitary ferns up to three meters tall. Creeping rhizomes, leather fronds and densely hairy on the underside. Brown spores on the underside of frond segments. New growth emerges as fiddlenecks.

**Habitat:** Open woods, roadsides, burned areas, prefers neutral to acidic soil.

**Animals Affected:** Primarily horses, also cows and sheep.

**Toxin Family:** Thiaminase, ptaquiloside.

**Other:** Thiaminase causes thiamin deficiency in horses and pigs. Animals must eat large quantities and the deficiency is characterized by central nervous system depression. Ptaquiloside is a carcinogenic and bone marrow depressant nosquiterpene glycoside affecting cows and sometimes sheep. Newly emerging fiddleheads are especially toxic and palatable, but animals must eat their weight over several months for disease to develop. Consumption over long periods will cause carcinogenic tumors in the bladder and other parts of the digestive tract. Bracken fern can also cause retinal degeneration and blindness in sheep. Toxins remain in hay and silage. Not highly palatable. All parts poisonous, root stock especially.

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway.
**False Lupine, *Thermopsis rhombifolia***

**Identification:** Erect, rhizomatous perennial. Alternate leaves are broadly elliptic and trifoliate (unlike lupine with five or more leaflets). Flowers are yellow and pea-like and grow in dense terminal racemes up to 4" long. Seed pods are densely haired and curved.

**Habitat:** Roadsides, pastures and rangeland

**Animals Affected:** Cattle

**Toxin Family:** Quinolizidine alkaloids causing muscle degeneration.

**Other:** Animals that have eaten false lupine show a reluctance to move and muscle tremors if forced to move. Not palatable.

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway
Puncture Vine, *Tribulus terrestris*

**Identification:** Prostrate, pubescent annual. Pinnately compound opposite leaves with oblong leaflets. Solitary yellow flowers in leaf axils. Fruit is a small, spiny capsule

**Habitat:** Waste areas and roadsides

**Animals Affected:** All livestock

**Toxin Family:** Steroidal sapogenins and physical injury

**Other:** Causes insoluble crystalloid substance in bile ducts, blocking the biliary system and causing photosensitivity. Can also cause neurological symptoms and incomplete paralysis. Burrs are injurious to livestock and humans

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway
Cowcockle, *Vaccaria pyramidata*

**Identification:** One to three foot annual with many branching stems. Leaves are opposite, lance shaped and clasp the stem. Flowers occur singly at stem ends and are bright pink.

**Habitat:** Cultivated fields, roadsides, waste areas

**Animals Affected:** Most livestock

**Toxin Family:** Saponin

**Other:** Can cause liver degeneration and death if eaten in large quantities. Seeds are especially poisonous to livestock.
Cocklebur, *Xanthium strumarium*

**Identification:** Four- to five-foot bushy annual. Large triangular, rough, glandular leaves. Flowers produced in leaf-axils. Blooms in summer, female flowers become bur with hooked bristles.

**Habitat:** Cultivated fields, pastures, barnyards, esp. sandy soils. Seeds germinate quickly with receding water.

**Animals Affected:** All livestock

**Toxin Family:** Sulfated glycoside (Carboxyactractyloside) causing liver necrosis.

**Other:** Death occurs rapidly. Seedlings and seeds are very toxic, but toxins are not present in mature plants. Seeds are rarely eaten as they are contained in a bur. Toxicity remains in hay and silage. Burs also cause economic damage to wool producers.

Provided by Karin Neff, Andy Hulting, Mylen Bohle and David Hannaway