Hay Varieties to Avoid for Horse Hay and Pasture
Compiled from a variety of sources

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We have been repeatedly asked about feeding clover to horses. Unfortunately, many hays and/or pasture contain clover. While many horse owners feed it as a portion/percentage of the hay, the experts caution against feeding clovers to horses.

Also as a service to our customers, please note the warning, at the end, about **Red Maple trees**, and how they may affect your horses.

Below, please find a BRIEF overview regarding clovers.

Pat Coleby's *Natural Horse Care*, **"Iodine is absolutely essential for the healthy of the thyroid gland which controls the health of all the glands in the whole body—no thyroid, no life. Therefore, if an animal is iodine deficient, no matter what feed or minerals or vitamins it is given, they will not be assimilated properly until the iodine requirements are met."**
She also goes on to say **that iodine deficiency should always be considered as the base cause of practically every problem**.
Interestingly, Coleby also adds that a potent and common cause of iodine deficiency is the overfeeding of legumes such as alfalfa and clover...because, in extreme cases, they cause the goiter to swell. "Feeding too many legumes will cause a preponderance of male offspring. The female fetus has the greatest need for iodine. If there is a deficiency, she does not develop and is probably reabsorbed. It is also possible in some cases that females are not even conceived."
(Note: to the person that "borrowed" my *Natural Horse Care* book by Pat Coleby, I would appreciate its prompt return.)

Sweet Clover can not only cause digestive upset, but have life threatening consequences as well. It contains coumarins, substances related to the prescription blood-thinner warfarin.
Sweet clover was widely used as hay in the 1920s when a series of wet summers led to an epidemic of "bleeding disease" in cattle. The cause of the disease was traced to sweet clover hay that had been improperly cured and infected with molds. There was also evidence that the defective coagulation in the cows was due to a deficiency in prothrombin.
According to South Dakota State University Range Specialist Roger Gates and McPherson County Extension Education Lanette Butler, "**Sweet clover** contains the compound coumarin, which is converted to dicoumarol if moldy. Dicoumarol interferes with blood clotting and excessive bleeding may result in livestock including horses. This is known as sweet clover bleeding disease.
"Mold can colonize the stem of sweet clover and even if you do not see it, it may still be present. Mold can also multiply if the stem is damaged."

From the Merck Veterinary Manual:

"Sweet clover poisoning, an insidious hemorrhagic disease, is seen in animals that consume toxic quantities of spoiled sweet clover (*Melilotus officinalis* and *Malba*) hay or silage.

"During the process of spoiling, the harmless natural coumarins in sweet clover are converted to toxic dicumarol. Any method of hay storage that allows molding of sweet clover promotes the likelihood of formation of dicumarol in the hay. Weathered, large round bales, particularly the outer portions, usually contain the highest levels of dicumarol. When toxic hay or silage is consumed, hypoprothrombinemia results, presumably because dicumarol combines with the proenzyme required for synthesis of prothrombin (by preventing formation of the active enzyme). It probably also interferes with synthesis of factor VII and other coagulation factors. (*See* HEMOSTATIC DISORDERS, *Hemostatic Disorders:Introduction*.)

"Dicumarol levels of 20-30 mg/kg of hay are usually required to cause poisoning in cattle. The toxic agent crosses the placenta in pregnant animals, and newborn animals may be affected at birth. **All species of animals studied are susceptible**, but instances of poisoning have involved mainly cattle and, to a limited extent, sheep, pigs, and horses. Clinical signs are referable to hemorrhages that result from faulty blood coagulation. The time between consumption of toxic sweet clover and appearance of clinical disease varies greatly and depends on the dicumarol content of the particular sweet clover variety being fed, age of the animals, and the amount of feed consumed. If the dicumarol content of the ration is low or variable, animals may consume it for months before signs of disease appear.

"The first indication of dicumarol poisoning may be the death of one or more animals. In affected animals, the first signs may be stiffness and lameness, due to bleeding into the muscles and joints. Hematomas, epistaxis, or GI bleeding may be seen. Death may occur suddenly with little preliminary evidence of disease and is caused by massive hemorrhage or bleeding after injury, surgery, or parturition. Neonatal deaths rarely occur without signs in the dam.

"…the only certain method of prevention is to avoid feeding sweet clover hay or silage…. the absence of visible spoilage is insufficient evidence of safety. There is no quick chemical test for dicumarol, but suspect feed can be fed to rabbits, which develop fatal hemorrhages more rapidly than cattle. This can be combined with periodic determination of PT in the rabbits to speed up the test results. Unfortunately, some rabbits are refractory to dicumarol, which complicates negative test results.

"A simple management technique involves alternating sweet clover hay suspected of containing dicumarol with other roughage such as alfalfa or a grass-legume hay mixture. A seven to 10-day period on the sweet clover hay is followed by an equal time on the alternate hay. Alternating the forage can successfully prevent poisoning but does not completely prevent prolonged bleeding times. Some animals are at greater risk of serious hemorrhaging… They should not receive sweet clover hay for a minimum of two to three weeks and preferably four weeks prior to parturition. The goal is to allow the animal's clotting system to fully re-establish competency before a hemorrhagic stress. …castration should also be avoided in animals consuming sweet clover hay at least until a full withdrawal period has been achieved."

Alsike Clover

Seed mixes intended for horse pastures and hay should not contain alsike clover. Alsike clover can cause photosensitivity and hepatic failure in horses. Alsike may even cause colic, depression or excitement, and diarrhea.

Alsike Clover Toxicity in Horses

Hay or pasture containing a large percentage of alsike clover is generally not recommended for horses.

- Why?
- What are the symptoms of alsike poisoning?
- Why is it that some horses seem to be able to eat alsike with no ill effects?

The confusing aspect of the disease is that none of these questions have straightforward answers. Firstly, the compound that causes the toxicity is not known for sure. Secondly, the symptoms vary and thirdly, susceptibility seems to depend on the area where the alsike is grown and the individual horse.

The most common symptom of alsike clover poisoning is photosensitization or a reaction to light. The real problem, however, which is not so readily observed, is liver damage. The photosensitization is not caused directly by the alsike, but rather is a secondary problem.

Dr. A. A. Seawright has summarized the literature concerning photosensitization:

> "***Alsike clovers*** *may contain some compound, possibly an alkaloid, which causes liver dysfunction. If this cirrhosis of the liver is allowed to continue, death may result.*
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> *The plant material that the horse eats contains chlorophyll. Bacteria in the intestinal tract change the chlorophyll into another substance, phylloerythrin, which is all quite normal. In an animal with a healthy liver, the phylloerythrin is removed from the blood by the liver and excreted in the bile. However, in an animal where the liver has been damaged, it cannot pick up the phylloerythrin. It then is carried by the blood and deposited in the skin cells. When light of a certain wavelength is absorbed by the skin it reacts with the compound, damaging the cell and causing inflammation and redness. This occurs only on areas unprotected by thick skin, hair covering or pigmentation, such as in black skin. Therefore, liver damage may be present without any signs of photosensitization. Some horses may die within 24 hours of alsike consumption.*"

White Clover

The high-protein green clover can cause excessive gas formation and colic. White clover and its hybrid Alsike clover have been associated with a syndrome in horses called "dew poisoning" or trifoliosis (see above). Alsike clover in wet humid climates can become infected with a fungus that produces toxins that affect the liver of horses grazing the clover. Weight loss and photosensitization (severe sunburn-like lesions on the white skinned areas) secondary to liver disease is highly suggestive of alsike clover poisoning. White clover contains chemicals called cyanogenic glycosides that can release cyanide, a well known nerve toxin. Interestingly, the levels of cyanide in white clover increase when the plant is rapidly growing, as occurs during the spring flush, which coincides with the peak seasonal occurrence of EGS. Furthermore the levels of cyanide also increase when clover is exposed to adverse weather stresses, such as drought, cold, frost and snow. This may explain why EGS often occurs after periods of dry cold weather, especially when there are sharp overnight frosts.

During hot, humid and wet seasons white clover grows abundantly in many pastures. The mold grows on the small leaves, producing black or brown spots on them, which can easily be seen. Horses love white clover and after eating the infected plant for several

days they begin to slobber a large amount of saliva. They may "run at the eye," have diarrhea, lose weight and their mucous membranes may turn slightly yellow. One noticeable symptom is frequent urination with the urine being yellow in color. **Pregnant mares, eating much infected clover, may abort.**

Red Clover

Clover is difficult to dry properly and may have mold. This black patch fungus on leaves can produce slaframine, which is known as the "slobber factor" (see above) and will make horses salivate profusely. **In horses, it can cause dehydration to a life threatening degree.** This is commonly seen in some parts of North America. Red clover has also been associated with **red urine** in some horses. Porphyrins are excreted into the urine and will oxidize and turn red. **This is usually seen during the winter when horses urinate on the snow.**

This fungus is also found quite often on white clover types and should be suspected anytime excessive slobbering is observed in the horse.

Red clover can cause many of the same symptoms as described above for the other clovers. A field that is thick with red clover can cause the horse to have excessive salivation, bloating, stiffness, diarrhea, blindness, and cause abortion. The horses may also founder.

Source: *Horse Owners Field Guide to Toxic Plants* by Sandra M. Burger

"Some legumes are hard to dry (like Red Clover) when making hay, and, therefore, are at a higher risk of molding." University of Minnesota Extension Service.

Red Maple

Of the non-ornamental native trees, the most deserving of the skull-and-crossbones warning are those that produce cyanide in their wilted leaves. **Cyanide suffocates animals by blocking oxygen transport via the red blood cells** (Note that white clover can also cause cyanide poisoning). The **red maple (Acer rubrum)** is one such tree whose leaves are harmless most of the year until wind damage or seasonal change causes them to fall from the tree and wilt. Red maple leaves have serrated edges and can turn either red or yellow in the fall.

"There are other trees that shed red leaves in the fall, but the red maple has some distinctive features," says Anthony Knight, BVSc, MRCVS, who specializes in toxic trees and plants at Colorado State University. *"The underside of the red maple leaf tends to be silvery in color."*

Signs of poisoning, including lethargy, discolored urine and darkened gums, may not appear for four days.

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While many horse owners have fed or continue to feed hay/pasture that has some type of clover in it and have never encountered problems that they are aware of, they should be aware of the potential dangers that exist. Quantities or the percentage of clover in hay/pasture that is consumed may have a direct bearing. It may, perhaps, be wise to eliminate any clovers when seeding for hay or pasture and thus eliminate any potential for problems. As always, the final decision to feed or not feed clovers rest with the horse owner.