Prussic Acid

Carl S. Hoveland, Crop & Soil Sciences Dept., Univ. of Georgia, Athens, GA

WARNING! Your cattle may be in danger of death at this time of year. But, a few simple and cheap precautions can protect them. Unfortunately, some cattle are lost each year from prussic acid poisoning, all of them easily preventable.

What causes this kind of poisoning?

Sorghum-sudan hybrids, sorghums, and johnsongrass contain cyanogenic glycosides in the outer cells of leaves which normally cause no problems to grazing animals. However, under certain conditions, enzymes present in interior cells of the leaves can cause the glycosides to release free cyanide. This is called *prussic acid or hydrocyanic acid or HUN* which is highly toxic to livestock even in small quantities. Damage to the plant from wilting, drought stress, and frost causes a breakdown in plant structure which may allow release of cyanide. This is the same deadly stuff some terrorists have used to kill people. In addition to sorghum-sudangrass, sorghums, and johnsongrass, wild cherry, a small tree found throughout Georgia, can cause livestock losses. Other grasses, including pearl millet, do not have the potential to produce prussic acid.

Prussic acid poisoning can result during summer droughts but generally more livestock losses occur at frost time in autumn. The danger time is immediately after a killing frost when prussic acid is produced rapidly and animals consume the tender frosted forage. Pastures of sorghum-sudangrass, grain sorghum stubble with new shoots, and wild cherry leaves can be deadly at this time. Small amounts of this material can be consumed by cattle and detoxified in the body but larger amounts quickly cause problems from too much cyanide.

Prussic acid and nitrate poisoning are not the same. Toxic levels of nitrates result from nitrogen fertilization followed by severe drought stress or sometimes frost. Pearl millet, sorghumsudangrass, and bermudagrass can have nitrate toxicity. High nitrate levels in hay will remain toxic while prussic acid in hay deteriorates over time. Frosted prussic acid-containing grass in pasture will be safe to graze within one week. The tricky part is that sometimes a frost will kill johnsongrass or sorghum in a low area and then a later frost will kill the remainder of the pasture so one should be alert to the potential danger.

What are the animal symptoms?

Prussic acid causes death by interfering with the oxygen-transferring ability of red blood cells, causing cattle to suffocate. Typical symptoms include excessive salivation, very rapid breathing, and muscle spasms, all of which may occur within 10 to 15 minutes after the animal consumes forage containing prussic acid. Cattle may stagger, collapse, and eventually die. Death of animals is common because it occurs so rapidly after consumption of the poisonous forage.

How can I prevent prussic acid poisoning?

(1) Know what forage plants have the potential for prussic acid toxicity: sorghum-sudangrass, forage or grain sorghum, and johnsongrass. All of them are valuable forage plants with good nutritive value and can be safely used with proper precautions.

(2) Do not graze cattle on these plants when they have been severely drought-stressed or subjected to a killing frost. It is a good idea to remove cattle from pastures of sorghums or johnsongrass when there is risk of a heavy frost. After they are frosted, avoid grazing cattle on these forages for a week after which it will be safe to do so.

(3) Frosted forage will be safe to use as hay after it has been dried enough to be safely baled (18 to 20 percent moisture).

(4) Wild cherry trees are a special problem. During droughts, grass in pastures is limited and if hay is not being fed, hungry cattle may consume substantial amounts of wild cherry leaves containing prussic acid. However, at any time during the growing season, wild cherry limbs may be broken off during a storm and lie on the ground. Wilted leaves on these fallen limbs will have large concentrations of prussic acid which can be deadly when consumed by cattle. Frosted leaves in autumn are also deadly. These leaves are often consumed by cattle if pasture growth is short because of autumn drought. The best solution is to eliminate wild cherry trees from pastures and loafing areas or fencing off wooded areas where these trees occur. Wild cherry can be a dangerous plant in cattle pastures and cause serious losses.