Managing Toxic Forages

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In the June issue of the Georgia Cattleman, I discussed the causes, symptoms and management of nitrates in forages. This article is an important one to review because I've received many calls from county extension agents reporting toxic nitrate levels- some samples have exceeded 15,000 parts per million! I encourage you to revisit this article either in the June 2002 issue of the Georgia Cattleman or online at www.georgiaforages.com. I also urge sampling of all hay harvested this summer for nitrates to determine if management strategies are needed for safe feeding. This $10 test is an excellent investment given the drought conditions we've endured this summer and will also allow hay quality to be determined for efficient supplementation.

An additional risk of grazing drought stressed forages is hydrocyanic acid poisoning. This is more commonly known as prussic acid or cyanide poisoning. While prussic acid toxicity occurs less frequently than nitrate poisoning, a few cases have been reported in Georgia and South Carolina this year. In this article I'll address causes and symptoms of prussic acid poisoning and review management strategies to help prevent cattle losses.

Species affected and prussic acid formation

Prussic acid or hydrocyanide is formed in certain plant species during water stress or frost conditions. Under normal growing conditions, these plants produce a nontoxic substance called dhurrin. When plants are injured by frost or wilting, enzymes come into contact with dhurrin and liberate toxic prussic acid. Concentrations of prussic acid can also be high in young, rapidly growing tillers.

Plants in the sorghum family are susceptible to prussic acid formation and include johnsongrass, sudangrass, sorghum and sorghum-sudan hybrids. Wilted wild cherry leaves can also contain lethal amounts of prussic acid. Unlike sorghums, pearl millet does not produce prussic acid (but does accumulate nitrates) and can be safely grazed following a frost.

Prussic acid is most concentrated in young leafy tissue which is also the plant part preferentially selected by grazing animals. Therefore, unlike nitrate toxicity, grazing pastures lightly to reduce toxin intake is unlikely to succeed.

Toxic mechanism

Prussic acid is lethal to animals because it interferes with the animal cell's ability to generate energy. This ultimately results in death. Simply put, cyanide prevents oxygen transfer from the blood and animals suffocate at the cellular level. Because blood from prussic acid poisoned animals does not release oxygen, venous blood is normally a bright cherry red color when a postmortem examination is performed. This is a good indicator that prussic acid poisoning has occurred.

Prussic acid poisoning occurs rapidly. The time from ingestion of toxic forages to death is usually short with animal losses sometimes occurring within 10 to 15 minutes of grazing affected pastures. Typical animal symptoms include excessive salivation, rapid breathing, and muscle spasms. Because the tissues cannot receive oxygen, mucous membranes often have a purplish color. Animals are occasionally observed staggering through the pasture before collapse and death. Successful treatment is almost impossible because of the rapid progression of symptoms. Animals must be removed from toxic pastures immediately. Preventative management is the only reliable method to avoid animal losses.

Management

There are indications that adequate soil phosphorus can decrease the potential for prussic acid formation. Conversely, heavy nitrogen fertilization may increase hydrocyanic acid content. It is important to soil test fields and follow fertility management recommendations to ensure appropriate nutrients are present for plant growth. Excessive nitrogen applications should be avoided to decrease the probability of toxic nitrate and prussic acid levels.

Do not allow cattle access to susceptible plant species immediately following a drought ending rain. Rapidly growing young plant tissue can contain toxic levels of prussic acid for 7-10 days. Frost damaged plants also can contain high levels of prussic acid. Grazing in frosted fields should also be avoided for at least a week. Use extreme caution when grazing frosted fields as stands are often not completely killed. New tillers or surviving tillers following a frost can be highly toxic and should also be avoided for 1-2 weeks.

Cured hay harvested from frost or drought stressed pastures will not contain toxic amounts of prussic acid as the concentration will deteriorate by the time of baling. Silage should also be safe for feeding after the ensiling process is complete (approximately 3 weeks). Remember, nitrate toxicity is different than prussic acid poisoning. Unlike prussic acid, toxic levels of nitrate will remain in hay and do not diminish over time. Testing for nitrates is critical to ensure safe hay feeding, especially following the dry weather of this year.

Remove wild cherry trees from pastures or minimize animal exposure to them by fencing off wooded areas. Examine areas containing cherry trees immediately following storms; particularly when forage is in short supply as animals will be more likely to consume the leaves.

Prussic acid can be a serious problem, especially in drought years. Hopefully this article sheds light on the causes and management techniques to help avoid losses from this form of poisoning.