With the start of fall comes the risk of cyanide poisoning in ruminants. Cyanide, prussic acid, hydrogen cyanide or hydrocyanic acid poisoning are all terms describing the same condition. A number of common plants, including sudangrass, johnsongrass, sorghums and sorghum-sudangrass hybrids contain cyanogenic glycosides in the outer cells of the plant. Further inside the leaf tissue are the enzymes needed to convert these compounds to the cyanide poison. When the plant undergoes a stressful event such as cutting, wilting, freezing, drought, crushing, trampling, chewing or chopping, the plant cells rupture which allows the cyanogenic compounds and the enzymes to combine and produce hydrogen cyanide gas. Ruminants also have microflora in the rumen capable of converting the cyanogenic compounds in the plant into cyanide. The toxic gas goes to the bloodstream and blocks a necessary step in the release of oxygen from red blood cells. The animal essentially dies from lack of oxygen. Clinical signs of cyanide poisoning can occur within minutes to hours after consuming the toxic forage. Usually the affected animals are found dead but, if observed early, may show rapid, difficult breathing, frothing at the mouth, muscle tremors, staggering and then collapse. The mucous membranes (such as the gums) are bright pink and the blood can be a bright cherry red color.

It is important to recognize and avoid situations in which these forages pose a danger to livestock. Cattle and other ruminants should only graze sorghum, sorghum hybrids, or johnsongrass when the plants have reached at least 18-24 inches in height. Do not graze plants with young tillers. Do not graze these plants during drought periods when growth is severely reduced or the plant is wilted or twisted and wait at least one week after rainfall to resume grazing. Do not graze at night when frost is likely. Frost allows conversion to hydrogen cyanide within the plant. Do not graze for two weeks after a non-killing (>28 degrees) frost. It is best not to allow ruminants to graze after a light frost as this is an extremely dangerous time and it may be several weeks before the cyanide potential subsides. Do not graze after a killing frost until the plant material is completely dry and brown.

If a high cyanide is suspected in forages, do not graze or feed as green chop. If cut for hay, allow at least 72 hours or longer before baling so that the cyanide will dissipate. Allow thorough drying because toxicity can be retained in cool or moist weather. Delay feeding silage 6 to 8 weeks following ensiling.
Cyanide (Prussic acid) Field Test using Cyantesmo Paper

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1. Collect a large handful of leaves or forage material to be tested. (Note: With a cherry tree just collect the leaves; with Johnsonsgrass or sorghum-sudangrass collect the whole plant that the animal will likely consume. Young shoots are the most toxic).

2. Tear leaves/forage into small pieces; also mash plant material to cause additional plant cell injury. (Remember that you are simulating how plant material turns “mushy” after frost or what happens when an animal chews fresh leaves and stems).

3. Place the sample into a zip-lock baggie containing a one inch strip of Cyantesmo paper. The bag should be approximately half full. Keep the forage from directly contacting the paper strip so that you can easily evaluate the strip for color change.

4. If the sample material is dry (some plant juice should squeeze out), you will need to add about 1 tablespoon of water to the baggie or enough water so the material in damp.

5. Seal the baggie and place it in a warm area such as on the hot hood of a vehicle directly in the sun. Often just laying the baggie in direct sunlight causes enough heating for cyanide gas to released if it is present in the plant material. This field test should be performed outdoors in a well-ventilated area.

6. Wait 10 minutes then evaluate the color of the test strip.

7. If the strip turns a dark blue, the sample is positive for cyanide. If the strip is the same very light green color as before adding the sample, the sample is negative for cyanide. Some blue color change indicates that some cyanide is present.

8. This test is simply a screening test to determine whether or not cyanide can be generated from the sample being tested. The exact concentration of cyanide cannot be accurately measured using this method in the field, but a for forage sample that quickly turns the strip dark blue could potentially pose a significant risk for cyanide poisoning. Any sample that causes no color change in the test strip after 30 minutes is likely to pose minimal risk of cyanide poisoning, as long as the sample was moist enough for the reaction to occur. (The sample material should be damp “to the touch” from plant juice or from the water you have added).

Note: Varying shades of blue can develop over time, indicating trace amounts of cyanide are being generated. Test strips should be evaluated after 30 minutes if possible for trace amounts of cyanide.

Multiple samples should be tested to get a good representation of the field or source.

Disposal: The sealed baggie can be discarded in the garbage, or the baggie can first be opened and ventilated outdoors in a well-ventilated area. Do not breathe the fumes from the baggie, as cyanide gas is released as soon as you open it.

Cyantesmo paper can be purchased at CTL Scientific Supply Corp (item 90604) for approximately $45 for a 5 meter-long roll. The paper itself should not be handled without wearing disposable gloves.

Note in Kentucky we have made these available in “test kits” to county agents. Test kits includes: Fifteen 1 inch strips of test paper and a glove.
Cyanide Test Kit

No color change: No cyanide likely

Blue: Positive for cyanide

Dark Blue: strong positive for cyanide

Plastic bag should be half full of crushed material, then place strip in top of bag and seal tightly.