

Managing Prussic Acid in Livestock Feed

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What is Prussic Acid?

Prussic acid is a chemical compound found in several plant species common in Saskatchewan livestock feed when the plants experience stressful growing conditions. While non-toxic in the form of prussic acid, when ingested by ruminant livestock, a bond is cleaved in the rumen resulting in hydrocyanic acid, or cyanide, which is then absorbed into the bloodstream. Conditions favouring prussic acid accumulation include, but are not limited to frost, hail, drought, insect pressure or mechanical damage at harvest. Under such conditions, plant cells rupture, resulting in the accumulation of prussic acid.

How does Prussic Acid Affect Livestock?

When the free cyanide is absorbed into the bloodstream, it binds to hemoglobin, preventing the uptake and release of oxygen throughout the body. Signs of prussic acid poisoning include excessive salivation, rapid breathing, staggering, or convulsions. In some cases asphyxiation and death can occur within several minutes to a few hours, depending on acid concentration. Livestock poisoned by prussic acid will exhibit bright red blood (cherry), unlike livestock experiencing nitrate poisoning where blood is dark brown (chocolate). Treatment for prussic acid poisoning is typically unsuccessful given the rate at which poisoning can lead to death. Contact your veterinarian for treatment options if you suspect prussic acid poisoning has occurred.

Plants and Grains That May Accumulate Prussic Acid:

- Sorghum
- Sudan grass
- Sorghum-sudan hybrids
- Flax (green)
- Johnson grass
- Birdsfoot trefoil
- Cherry tree species
- Vetch species
- White clover

Immature plant tillers and forage regrowth (<18-24 inches) typically pose the greatest risk of prussic acid poisoning, as prussic acid is most concentrated here.

Managing Prussic Acid

- Unlike nitrates, prussic acid will gas-off over a period of 10 to 14 days following a stressor event, even after the forage is cut.
- Do not store the feed in a bin or bale where oxygen cannot penetrate the feed prior to the 10 to 14 day gas-off period – this will prevent the prussic acid from escaping.
- Ensiling eliminates the risk of poisoning, as fermentation enzymatically reduces prussic acid to free cyanide which escapes upon feed-out.
- Do not turn hungry livestock into a field with high-risk plants, provide hay first before grazing.
- Allow plants to reach 18 to 24 inches in height before grazing.

Prussic Acid Testing Options

Because prussic acid will gas-off over time, testing of forages is likely ineffective due to the lack of laboratory testing options in Canada, and the increased time and cost of shipping to out-of-country laboratories. Delay in results paired with actual forage acid concentration changing daily also impacts the usefulness of results when making feeding or grazing decisions. While laboratory testing is still recommended for stored forages and grains, other cost-effective technologies, such as cyantesmo paper, exist and can be used to test freshly cut forage on-site, giving producers a real-time answer, enabling them to make safer grazing decisions. See the reverse side for testing protocols.

Testing and Cyantesmo Paper Protocol

Cyantesmo Paper Protocol

Fresh-Cut Forages Only

1. Obtain fresh-cut samples of desired forage, focus on collecting leaves and tillers as this is what livestock will select for and where the greatest concentration of acid will be.
 - » Collect samples from multiple locations within a field to ensure a representative sample is obtained.
2. Cut forage into one inch pieces, place in an air-tight large plastic freezer bag as quickly as possible.
3. Collect enough forage to fill 1/2 to 3/4 of the bag.
4. Mash or crush forage while in bag to simulate “chewing” effect.
 - » If forage is dry, add five millilitres water before mashing to stimulate a reaction.
5. Place a one inch strip of cyantesmo paper into the bag, not touching the forage, held in place by scotch tape so it can be easily monitored for colour change.
6. Seal the bag and place in a warm area to speed up the reaction.
 - » The hood or dash of a vehicle, in the sun is typically an ideal location.
7. Monitor the paper every 10 minutes for one hour for any colour changes.
 - » The rate and level of colour change can be used as a qualitative indicator of prussic acid concentration.

Disclaimers:

- Collecting a representative sample of a field is important to mitigate the risk of sampling error.
- Caution should still be practiced when utilizing at-risk forages.
- Cyantesmo paper is available for purchase online from CTL Scientific (Item # 90604).
- Avoid direct skin contact with cyantesmo paper as it has carcinogenic properties.
- Dispose of samples in a well-ventilated or outdoor area to prevent potential gas inhalation.

Cyantesmo Paper Colour Change Key

	No Change Safe
	Minimal Change Safe
	Moderate Change Exercise Caution
	Large Change Not Safe

Testing Stored Forages, Grains and Screenings:

- Collect stored forage samples using a bale probe, as the center of the bale is where prussic acid will become “trapped”. Obtain samples from multiple bales to ensure representative sampling.
- Collect grain or screenings as they are being unloaded to ensure random sampling.
- Collect enough feed to fill a large freezer bag.
- Freeze the sample and ship on ice to the laboratory.

For more questions on prussic acid production, sample collection or assistance with laboratory selection, contact the Agriculture Knowledge Centre at 1-866-457-2377.