

Beware of Nitrate Poisoning in Livestock

July 2008

Source: Greg Lardy, (701) 231-7660, gregory.lardy@ndsu.edu

Source: Charles Stoltenow, (701) 231-7522, Charles.Stoltenow@ndsu.edu

Some crops likely will not be harvested because of low yield potential. Producers planning to use these crops as forage should have them analyzed for nitrate before feeding them to cattle or sheep or allowing livestock to graze on them, advises Charles Stoltenow, North Dakota State University Extension Service veterinarian, and Greg Lardy, NDSU Extension beef cattle specialist.

Ruminant animals, such as cattle and sheep, are susceptible to nitrate poisoning because their digestive process converts nitrate to nitrite, which in turn is converted to ammonia.

“The same reaction takes place in the hindgut of the horse; however, it occurs to a much lesser extent, and thus horses are generally tolerant of rather high concentrations of nitrate,” Stoltenow says. “Nitrate poisoning is considered to be very rare in horses and is more likely to be associated with exposure to a fertilizer spill than with grazing forages.”

The majority of nitrate poisoning cases in North Dakota occur with drought-stressed oats, corn and barley. However, a number of other plants also can accumulate nitrate, including wheat, sudangrass, sorghum-sudan hybrids and pearl millet.

“Plant stresses, such as drought, are associated with increased levels of nitrate in plants,” Stoltenow says. “Nitrate accumulation is influenced by various factors, such as moisture and soil conditions and type of plant.”

Plant parts closest to the ground contain the highest concentrations of nitrates. Leaves contain less than stalks or stems, while the seed and flower usually contain little or no nitrate.

“While difficult to do with drought-stressed forages, raising the cutter bar above 6 inches can reduce nitrate content of forages,” Lardy says. “Research has shown that the lower 6 inches off the stem in pearl millet contains three times more nitrate than the top part of the plant.”

Not all drought conditions cause high nitrate levels in plants. Some moisture must be present in the soil for the plant to absorb and accumulate nitrate. If the major supply of nitrates for the plant is in dry surface soil, the roots will absorb very little nitrate. In plants that survive drought conditions, nitrates are often high for several days following the first rain.

Clinical signs of nitrate poisoning are related to the lack of oxygen in the blood. Acute poisoning usually occurs from a half hour to four hours after consuming toxic levels of nitrate. The onset of symptoms is rapid. Those symptoms include:

- * Bluish/chocolate brown mucous membranes
- * Rapid/difficult or noisy breathing
- * Rapid pulse (150-plus beats per minute)
- * Salivation, bloat, tremors, staggering
- * Dark “chocolate-colored” blood
- * Weakness, coma, death

“Pregnant females that survive nitrate poisoning may abort because of a lack of oxygen to the fetus,” Lardy says. “Abortions generally occur approximately 10 to 14 days following exposure to nitrates.”

Laboratory analysis can be performed on suspected plants, but samples need to be representative of the field or bales in question. Samples should be packaged in a clean plastic bag and shipped to a laboratory for analysis.

Producers can send samples to the NDSU Veterinary Diagnostic Laboratory, Van Es Hall, Fargo, ND 58105-5406. For more information, contact the lab at (701) 231-8307.

The best way to prevent nitrate poisoning is controlling the type and quantity of forage, Lardy notes. Avoid forages with potentially toxic levels or at least dilute them with feeds low in nitrate. When grazing, feed dry roughage first to reduce the amount of affected plants that hungry animals ingest.

“Contact your veterinarian or your local Extension office if you need assistance in determining the correct ratios of high and low nitrate forages to blend to develop a ration for a particular class of livestock,” Stoltenow says.

Nitrate poisoning also has been reported when tanks used to haul fertilizer subsequently are used to haul water to livestock, so tanks should be cleaned thoroughly before hauling water to livestock.

For more information on nitrate poisoning, check out Extension publication V-839, “Nitrate Poisoning in Livestock,” at www.ag.ndsu.edu/pubs/ansci/livestoc/v839.pdf.

NDSU
Extension Service
North Dakota State University

County Commissions, North Dakota State University and U.S. Department of Agriculture cooperating. North Dakota State University does not discriminate on the basis of race, color, national origin, religion, sex, disability, age, Vietnam Era Veterans status, sexual orientation, marital status, or public assistance status. Direct inquiries to the Vice President for Equity, Diversity and Global Outreach, 205 Old Main, (701) 231-7708. This publication will be made available in alternative formats for people with disabilities upon request, 701 231-7881.