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Farm Animal Council of Saskatchewan Inc.

Nitrate Poisoning

All plants contain some nitrate, but excessively high amounts are likely to occur in forages grown under stress conditions such as drought, frost, hail, low temperatures, herbicide applications or diseases.

Why Plants Accumulate Nitrates During Drought Conditions

When growing conditions are favourable, plants take up nitrogen largely in the form of nitrate. The nitrate is rapidly converted to ammonia which is incorporated into plant protein. Unfavourable growing conditions can interfere with nitrate use and cause it to accumulate in the plant. Under normal conditions, cattle convert the nitrates in forage to nitrite. This is then converted to ammonia and used by rumen microbes to make protein.

The problem arises when nitrate converts to nitrite faster than nitrite converts to ammonia. When this occurs, nitrite accumulates and is absorbed into the bloodstream where it binds to hemoglobin, thus reducing the oxygen carrying capacity of the blood. Animals can die by suffocation.

The amount of nitrate in plant tissues also will depend on plant species, stage of maturity, part of the plant and nitrogen fertilization. If the stress is removed and the plants recover, excess nitrate stored in the plant is metabolized over several days. Feed test to be sure

Legumes do not store excess nitrates in the plant material. Alfalfas, vetches, trefoils, peas and clovers generally do not accumulate nitrates.

Stage of growth markedly changes the nitrate content of forages. Nitrate concentrations usually are higher in young plants and decrease as the plant matures. However, plants grown in soils with excessive nitrates or grown under stress may be high in nitrate content at maturity.

Plant parts closest to the ground contain the most nitrate. Leaves contain less nitrate than stalks, and the seed (grain) and flower usually contain little or no nitrate. Most of the plant nitrate is in the bottom third of the stalk.

Nitrates in the soil are the source of nitrate in plants. While a positive relationship exists between soil nitrates and nitrate in the plant, the effect of nitrogen fertilization appears to be less important than the conditions listed previously in causing high nitrate content in forages.

Managing High Nitrate Feeds

- Forages that contain high nitrate levels can be diluted in the diet with grains or with other forages low in nitrates and then can be fed safely.
- Feeding grain in combination with high nitrate feeds helps reduce the effect of the nitrate content. Energy from the grain helps complete the conversion of nitrate to bacterial protein in the rumen.
- Frequent intake of small amounts of a high nitrate feed increases the total amount of nitrate that can be consumed daily by livestock without adverse effects, and helps livestock adjust to high nitrate feeds. Feed long stem forages such as

oat or barley hay that contain high amounts of nitrate in limited amounts several times daily rather than feeding large amounts once or twice daily.

- Under the right conditions pastures can also accumulate nitrates. Implementing good pasture management practices will reduce the risk of livestock losses to nitrate toxicity. Providing other feeds that contain little or no nitrate and grazing suspected pastures for limited periods of time each day for the first week to acclimate cattle will also help to reduce the risk. If possible, do not graze suspected pasture until one week after a killing frost.

Treating Nitrate Poisoning

- When nitrate is suspected, remove the contaminated feed and provide a high energy feed such as barley.
- A veterinarian should be called immediately to confirm the tentative diagnosis and administer treatment.
- Handle cattle as little and as quietly as possible to minimize their oxygen needs.

For more detailed information see:
Nitrate Toxicity SAFRR
www.agr.gov.sk.ca/Livestock/Beef.asp?firstpick=Livestock&secondpick=Beef
Nitrates Western Forage Beef Group
www.foragebeef.ca

Other CattleFACS available:
- Animal Health Concerns When Pastures and Feed are Limited (Drought)
- Annual Crops for Emergency Grazing
- Body Condition Scoring
- Calf Scours Overview
- Calving, When and How to Help
- Cancer Eye
- Carcass Quality Shortfalls
- Cattle Handling, In the Zone
- Colostrum
- Creep Feeding Calves
- Early Weaning of Calves
- Euthanasia in Cattle
- Feeding in a Cold Snap
- Feed Testing and Ration Balancing
- Managing Water Supplies in a Drought
- Non-Ambulatory Cattle (Downers)
- Not Enough Feed for the Winter?
- Problem Feeds

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FACS represents the livestock industry in advancing responsible animal care and handling practices in agriculture.

Associate Memberships are available from $50.00 – $199.99 + GST.
Active Memberships start at $200.00 + GST
Receipts are issued for all memberships.

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