

# American Agricultural Laboratory, Inc.

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*"Analysis You Can Grow With"®*



## Nitrate Toxicity in Feedstuffs

### Effect of high nitrate in feed.

- Nitrate (NO<sub>3</sub>) is converted into nitrite (NO<sub>2</sub>) in the rumen, which can then be absorbed into the animal's bloodstream. Nitrite converts hemoglobin to methemoglobin, which is unable to carry oxygen, causing the animal to die due to lack of oxygen.

### What causes high nitrate levels in feed?

- Nitrate accumulates in growing plants when environmental stressors slow the assimilation of nitrate into amino acids.
  - Stressors may include lack of sunlight or moisture, low temperatures, frost, hail, herbicide applications that injure the plant, insect pressure, and disease.
  - The highest levels of nitrate occur in plant stems and stalks, particularly in the lower portions.
- Low soil nutrient availability can also promote an increased level of nitrate in plants.
  - High levels of soil nitrate coupled with low levels of other essential nutrients can cause reduced plant growth with normal levels of nitrate uptake, leading to accumulation of nitrate.
    - For this reason, it is critically important to soil sample regularly and maintain proper nutrient levels in soil.

### What plant types are most susceptible to nitrate accumulation?

- The most frequent high nitrate plants are sorghum species (Cane, milo, sudangrass, sorghum-sudan) and weeds such as pigweeds, kochia, lambsquarters, and johnsongrass.
- Corn, oats, millets, and wheat can also accumulate nitrate if conditions are conducive, and especially when plants are harvested immaturity.

### What management strategies can be implemented to lower nitrate levels in feed?

- Maintain an efficient soil fertility plan to avoid overfertilization with nitrogen
- When harvesting forages, raise cutting bar above 12 inches to avoid lower stalks
- Ensiling feeds can reduce nitrate levels 40 to 60%

### Sampling for nitrates in feedstuffs.

- When sampling feed piles, take a representative sample for at least 6 locations within the pile and combine into a composite sample. A subsample can be taken from this composite if it is too large, if it is well mixed.
- If sampling bales, probe roughly 20 bales and combine into a sample.
- If individual bales or feed pile areas are suspected of being higher in nitrates than the rest, sample them on an independent basis.

### Nitrate analysis results and interpretations.

- American Agricultural Laboratory nitrate analysis results are reported as mg/kg of nitrate-nitrogen (NO<sub>3</sub>-N), on an oven dry (dry matter) basis.
- Our guidelines for interpreting nitrate levels are as follows:

NO <sub>3</sub> -N, mg/kg	Risk of toxicity
0-1500	Low; Safe to feed to cattle
1500-2100	Moderate; Mix with low nitrate feed for pregnant animals or adapt animals slowly to feed
>2100	High; Mix with low nitrate feed to total levels below 1500 mg/kg

For further information please refer to UNL NebGuide G1779 or contact American Agricultural Laboratory at 308-345-3670

Rasby, R. J., Anderson, B. E., & Kononoff, P. J. 2014. Nitrates in livestock feeding. *NebGuide G1779. Cooperative Extension Service Institute of Agriculture and Natural Resources University of Nebraska-Lincoln.*