COLORADO STATE UNIVERSITY
Veterinary Diagnostic Lab
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FACTORS RELATED TO NITRATE TOXICITY

1. All plants contain nitrate, but under stress certain forages such as corn, sorghum, oats, soybeans, Sudan, and sorghum/Sudan hybrids can accumulate toxic levels of nitrate. Many weeds (notably pigweed, Canadian thistle, kochia, and ragweed) also tend to accumulate nitrate.

2. Nitrate content varies widely throughout the plant but is usually greatest in the stalk and less in the leaves, with the highest concentration of nitrate being in the lower third of the plant stalk or stem.

3. Nitrate concentration is usually high in young plants and decreases as the plant matures. However, at high levels of soil nitrate or under conditions of growth stress, the nitrate content may be high at maturity. The highest levels of nitrate occur just before flowering and decline rapidly after pollination and seed formation.

4. Any abrupt setback to plant growth, such as drought or freezing, may result in high nitrate. Stressors such as lack of sunlight, temperature extremes, or hail damage can also cause nitrates levels to increase.

5. When silage is made from high nitrate forages, anaerobic fermentation converts nitrate to ammonia which can significantly reduce the nitrate content of the silage. The nitrate level in properly ensiled forages can decrease by 30%-60% over a 1 to 2 month period. Forages with significantly elevated nitrate levels at harvest should be retested before fed.

6. For nitrate analysis of harvested forage (hay or silage), a composite sample should be taken from six to eight different bales or locations in the silo. For baled feeds a cored sample is preferred.

7. The effects of nitrate levels in forage, feed, and water are additive. Livestock water containing 1000 ppm nitrate can contribute to the occurrence of nitrate poisoning when fed with moderate levels of nitrate in the feed.

8. High energy feeds and gradual introduction to high nitrate feeds will increase tolerance. Healthy animals have a higher resistance than animals that are ill or on a low plane of nutrition.

9. Clinical signs of acute nitrate poisoning include difficult breathing, chocolate-brown colored blood and mucus membranes, muscle tremors, weakness, reduced exercise tolerance, incoordination, collapse and acute death.

10.

Nitrate DW (as nitrate ion on a Dry Matter Basis)	**Estimated Toxicological Significance for Cattle**
0 - 5000 ppm	Considered safe to feed under all conditions.
5000 – 8800 ppm	Limit to 50% of the total dry matter in the ration.
8800 – 15000 ppm	Limit to 35 – 40% of the total dry matter in the ration**. Do not use for pregnant animals.**
15000 – 17000 ppm	Limit to 25% of the total dry matter in the ration. **Do not use for pregnant animals.**
Over 17000 ppm	**Feeds with over 17000 ppm nitrate may be toxic; do not feed.**