

## Nitrate Poisoning

Nitrate poisoning occurs in animals that ingest feed and forage with high Nitrate levels. Nitrate poisoning is caused when high Nitrate levels accumulate in a plant because of plant stressor factors such as drought and cool temperatures as well as soil conditions and plant type. Nitrate poisoning occurs commonly in cattle and sheep throughout the Great Plains region and is especially concerning in North Dakota since our growing environment is known to exhibit most of the favorable conditions described below.

Drought conditions followed by the first rainfall commonly cause Nitrate poisoning. When Nitrate is present but little to no moisture is available during a drought the roots absorb less Nitrate into the plant since they're absorbing less moisture. However, once the first rainfall occurs the root is actively absorbing the available moisture along with Nitrate. It is recommended to not feed or graze forage until several days past the first rainfall during a drought.

Plant stressor conditions such as cool temperatures and frost can also lead to Nitrate poisoning. These conditions cause a disruption to photosynthesis. When photosynthesis activity is disrupted it causes the plant to convert less accumulated Nitrate to proteins and stores more accumulated Nitrate in the base of the plant. Nitrate accumulation is concentrated to the bottom 1/3 of the plant stalk but can be present throughout the plant at lesser accumulations.

Soil conditions affect Nitrate accumulation based on the available nutrients in the soil. Fields that have been fertilized with Nitrogen typically have a greater probability of accumulating higher levels of Nitrate in the plant in comparison to fields that have not been fertilized. Other soil conditions such as acidic soils and micronutrient deficiencies are also known to cause Nitrate accumulation.

Lastly, plant type will impact the susceptibility to Nitrate accumulation. Nitrate accumulation is commonly found in annual forage grasses such as barley, corn, oat, millet, rye, sorghum and sudangrass. Plant type does not imply that you should not grow these crops but rather the importance of managing the feed and forage properly.

Nitrate poisoning is especially concerning for ruminant animals. Microbes in their digestive tract favor chemical conversions that can inevitably lead to acute or chronic Nitrate poisoning. When Nitrate enters the rumen, the microbes convert it to Nitrite. Nitrite is then converted into ammonia and finally into a protein. Acute Nitrate poisoning will lead to suffocation and death while chronic Nitrate poisoning leads to animal performance issues such as abortion, reduced milk production and weight loss.

It is important to be aware of these factors and to test your feed or forage if any of the aforementioned conditions occur. Keeping your animals away from a feed or forage source with potentially high Nitrate accumulation is important. If you are concerned your animal has consumed feed or forage with high Nitrate accumulations, consult a veterinarian.