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POST ROCK EXTENSION ANSWERS

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K-State Research and Extension

Planting sorghum variety feedstuffs has become increasingly popular throughout the district. A majority of it has either been or is getting ready to be swathed and baled, weather permitting that is. Others are grazing the forage. These forages have the potential to be an excellent source for cattle feed, but they also have the potential to accumulate nitrates. Even with the plentiful moisture we have been blessed with, I have still seen toxic nitrate levels in some fields. Many people associate high nitrate levels with drought stressed plants. This is true, but there are other factors that can contribute to high nitrate levels that cause concern on a yearly basis. Before we discuss those factors, let's gain a better understanding of what nitrates are.

So what are nitrates and why are they a concern?

Nitrate is a natural product formed from the oxidation of organic compounds. Most of the soil nitrogen absorbed by plant roots is in nitrate form. Normally, nitrate in a plant is rapidly converted to amino acids by the enzyme nitrate reductase. This reduction requires energy from sunlight, adequate water, nutrients, and favorable temperature. When plants are stressed, the nitrate-to-protein conversion is disrupted and nitrates begin to accumulate.

Nitrate toxicity is a misnomer because nitrite (NO₂), not nitrate (NO₃), is poisonous to animals. After a plant is eaten, rumen bacteria rapidly reduce nitrates in the forage to nitrites. Normally, the nitrites are converted to ammonia and used by rumen microorganisms as a nitrogen source. If nitrate intake is faster than its breakdown to ammonia, however, nitrites will begin to accumulate in the rumen. Nitrite is rapidly absorbed into the blood system where it oxidizes hemoglobin to methemoglobin. Red blood cells containing methemoglobin cannot transport oxygen, and the animal essentially dies from lack of oxygen.

What plants do I need to be cautious of?

Nearly all plants contain nitrate, but some species are more prone to nitrate accumulation than others. The sorghum family and millets are notorious nitrate accumulators. Some cereal crops that are commonly used in grazing such as oats and triticale can also accumulate high levels of nitrates. Another species of concern is brassicas such as turnips and radishes which are becoming more and more popular to graze especially in cover crop mixes.

We have had plentiful moisture during the growing season, why are you concerned about nitrates this year?

Drought stress is only one of the many factors that can contribute to high nitrate levels. Drought, hail, frost, cloudy weather, or soil fertility imbalance can all cause the stress to trigger high levels. Nitrate reduction occurs in young leaves and requires light as an energy source. Shaded plants lack sufficient energy to convert nitrate to amino acids. Plants growing in field corners may be shaded and are frequently high in nitrates. Extended periods of cloud weather increase nitrate content. Dangerously high levels can occur when wet, overcast days follow a severe drought. Conditions such as hail, light frost, or plant disease can damage plant leaf area and reduce photosynthetic activity. With less available energy, nitrate reduction is inhibited and

nitrate accumulate in the plant.

This does not mean these forages are always toxic, nor does it mean that high-nitrate hay can't be fed safely. The purpose of this column is to raise awareness of testing these feeds for nitrates in a lab to determine how to feed them safely. If faced with this, gradually adapt cattle to high nitrate feeds. Nitrate toxicity frequently occurs in animals without prior exposure to nitrates. If nitrate levels in the forage are not excessively high the animal will usually be able to adapt somewhat to increasing amounts in the feed. Frequent feeding in limited amounts throughout the day, rather than large amounts once daily will increase the total amount that can be fed safely.

Another common method of utilizing high nitrate forages is through dilution. Once you have tested for nitrates and know the nitrate levels, blend high nitrate forages with grain or low nitrate forages to dilute the high concentrations. It is important to note that, nitrate levels do not change once the forage is harvested. High nitrate hay baled last year, will still be high this year.

Bottom line is always test suspect forages whether you are grazing them or they are baled. A nitrate test is far cheaper than the cost of a dead animal. Your local extension office can assist you with nitrate testing and aid you in utilizing these forages if the test results are high.

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