



Ridin' Herd

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Nitrates in forages need to be managed during drought

Forage growing conditions across much of the United States warrant discussion on nitrates. Some forages grown under drought conditions have the potential to be high in nitrates. Understanding management practices that can mitigate the effects on beef cattle can help producers avoid a wreck. Feeds that contain nitrates can be successfully fed to cattle. Following is a discussion on management considerations when feeding feeds that contain nitrates to beef cattle.

Nitrates in forages

When feeds containing nitrates are consumed by ruminants, nitrates are changed in the rumen to ammonia that then may be converted by bacteria in the rumen into microbial protein. Nitrite is one of the intermediate products in the breakdown of nitrate and is the cause of nitrate poisoning.

Nitrite can be absorbed into the bloodstream. Nitrite in the bloodstream changes hemoglobin to methemoglobin. Hemoglobin carries oxygen from the lungs to other tissues in the body, but methemoglobin is incapable of carrying oxygen. Thus, nitrates become a problem when enough methemoglobin is produced that the oxygen-carrying capacity of blood is reduced to a critical level.

Nitrites in the blood cause a brownish discoloration of the blood due to the presence of methemoglobin. Besides the chocolate-colored blood, other physical signs of nitrate poisoning include difficult and rapid breathing, muscle tremors, low tolerance to exercise, incoordination, diarrhea, frequent urination, collapse and death.

Nitrates in blood may also cause blood vessels to dilate and are responsible for peripheral circulatory failure. Lack of oxygen to the fetus probably causes abortions that sometimes occur following nitrate poisoning. Abortion due to nitrate is accompanied or preceded by some evidence of nitrate problems in the adult animal, including chocolate-colored blood and bluish discoloration of unpigmented (around the eyes) areas of the skin or mucous membranes.

Dilute problem feedstuffs

Forages that contain high nitrate levels

can be diluted in the diet with grains or with other forages low in nitrates and then fed safely. This can be accomplished easily in feedlot rations, where grain is fed and forages are chopped and mixed as a complete ration.

Feeding grain in combination with high-nitrate feeds helps reduce the effect of the nitrate content. Energy from the grain apparently 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.

Cattle losses to nitrate toxicity usually occur in hungry cattle that have not had time for some adjustment to feeds with potentially toxic levels of nitrates. For example, cattle that go without feed for a day or longer during snowstorms often rapidly eat a large amount when they finally gain access to feed. If the feed they receive is high in nitrates, cattle losses may occur.

If cattle are allowed to adjust to feeds that are borderline toxic levels of nitrates, they will develop microbes in the rumen that convert nitrates to a nontoxic form. Feed long-stem forages such as wheat, oat and cane hay that contain high amounts of nitrate in limited amounts several times daily rather than feeding large amounts once or twice daily. In addition, long-stem hays suspected of nitrates can be fed in combination with hay low in nitrate to dilute the nitrate intake with little risk of nitrate problems. Livestock should have access to clean water at all times.

Grazing suspect pastures

Allowing livestock to graze pastures

suspected of having high nitrate levels is not without risk. Implementing one or more of the following management practices will reduce the risk of livestock losses to nitrate toxicity:

- Don't overstock suspected pastures.
- Don't strip-graze suspected pastures.
- Provide other feeds that contain little or no nitrate during grazing.
- Graze suspected pasture during the day and remove at night the first week to reduce the amount of pasture consumed and to acclimate cattle.
- If possible, don't graze suspected pasture until one week after a killing frost.

Corn plants grown in drought conditions can potentially contain nitrates. The majority of the nitrates will be in the lower 8 inches (in.) of the stalk. Raising the chopper height to 6 in. to 8 in. will reduce the amount of nitrates in the silage. Yield will be reduced, but so will nitrate level.

Ensiling drought-damaged corn can reduce nitrates in the silage 40%-60%. Before feeding drought-damaged corn silage, allow it to go through at least a 21-day fermentation period. Shorter fermentation times may cause some of the nitrates to still be in the dangerous nitrite form, just like heated green chop.

Final thought

Don't let cattle losses due to nitrates be a problem for your operation. Sample feeds, especially summer annuals grown under drought conditions, and test them for nitrates. Use management strategies to dilute nitrates in high-nitrate feeds and manage grazing situations that may expose cows to forages high in nitrates. Remember that total nitrate intake is the sum of the nitrates that come from the feed and the water.

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Editor's Note: "Ridin' Herd" is a monthly column written by Rick Rasby, professor of animal science at the University of Nebraska. The column focuses on beef nutrition and its effects on performance and profitability.