

## Nitrates in Drought Forages\*

Clyde Lane, Jr.  
Professor-Animal Science  
University of Tennessee

Producers need to be aware that nitrates can sometimes be a problem in drought stressed forages. High nitrate levels can cause illness or death in cattle. Producers need to know what causes these high levels and how to manage them.

High nitrate levels usually occur when high rates of nitrogen fertilizer are applied and the amount of available moisture is limited. The problems occur when the plants take up the nitrogen and then do not have sufficient moisture to produce new plant tissue. Sudan-sorghums or other plants in the sorghum family (such as corn) and bermudagrass are the plants most frequently found to contain high levels of nitrate.

What can a person do if he/she suspects high nitrate levels? In Tennessee the producer can contact their local Extension agent for assistance. The agent has or can get a solution of diphenylamine in sulfuric acid to test the forage to get a qualitative test for nitrates. A drop of this solution when placed on a sample of forage will turn a dark blue (almost black) if nitrates are present. This test does not tell how much nitrate is present, however, it does indicate if there is a need to send a sample to a laboratory for a test to determine precise levels.

If a producer does send a sample to a laboratory for analysis and finds that nitrates are present, there are guidelines for use of the forage. Table 1 below gives the guidelines for feeding.

**Table 1. Recommendation Feeding Levels with Various Nitrate Levels in Forages (Dry Matter Basis)**

%	ppm	Comments <sup>1</sup>
0-0.25	0-2,500	Generally considered <b>SAFE</b> .
0.25-0.50	2,500-5,000	<b>Caution Advised.</b> Generally safe when fed with a balanced ration. For pregnant animals limit to one-half of total dry ration. Make certain water for livestock is low in nitrates. Prolonged feeding may result in Vitamin A deficiency. Do not feed with liquid feed or other non-protein nitrogen supplements. Be cautious with pregnant and young animals.
0.50-1.5	5,000-15,000	<b>Danger.</b> Limit to one-fourth of ration. Should be well fortified with energy, minerals, and Vitamin A. May experience milk production loss in 4 to 5 days, possible occurrence of reproduction problems.
Over 1.5	Over 15,000	<b>Toxic.</b> Strongly consider <u>not using</u> . Do not use in free-choice feeding program. Feed containing such levels may be ground and mixed if high nitrate feed is limited to 15% of total ration.

Note from the table that a sample containing 0 to 2,500 ppm is safe for all classes of beef cattle. If the sample is in the 2,500 to 5,000 ppm range then caution is advised. Care must be taken to limit the affected forage to one-half of the total ration of a pregnant beef cow. Do not provide additional feed containing urea or other non-protein nitrogen and be sure that the water supply does not contain high levels of nitrates. The amount fed to young animals should also be limited.

Forages containing 5,000 to 15,000 ppm are very dangerous to feed. No more than one fourth of the ration should be made up of this forage. Blending of high nitrate forages that do not contain nitrate can be used to reduce levels, however, it is difficult to get a good blend. Hot spots may be present and may cause problems.

If blending is utilized, be very cautious and observe animals frequently. If the levels reported are greater than 15,000 ppm, the forage should not be fed.

It is desirable to check the nitrate levels in forages that are suspect before harvesting. If the levels are high, the harvesting of the forage should be delayed until moisture is present and the nitrates in the plants are used to produce plant tissue.

In summary, in drought situations, test forages that may contain high nitrate levels. Use caution when feeding the high nitrate forages, there may be spots that contain very high nitrate levels. These could cause a reduction in production or even death of the animals.

For additional information on nitrates in forages, contact your local Extension office.

\*These recommendations are general and actual results in cattle response can vary according to age, stress, health production and sources of other feeds consumed.