

Texas Dairy Matters

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Nitrates in Dairy Cattle Feeds

Tamilee Nennich, Ph.D.
Extension Dairy Specialist
Department of Animal Science
Texas AgriLife Extension Service
The Texas A&M University System

Nitrates in feeds and water can be poisonous to dairy cattle and other livestock. Under normal conditions, rumen microbes break down nitrates. However, intake of high levels of nitrate overwhelms the ability of the microbes to break down the nitrates and allows nitrate accumulation in the rumen. Nitrates are absorbed across the rumen wall into the bloodstream, where they substitute for oxygen in the blood.

Test forages to determine the concentration of nitrate present in the forage. Table 1 provides guidelines of how to use forages with various levels of nitrates. If forages are high in nitrate, consider ensiling the forage. The ensiling process reduces the nitrate concentration by 40 to 60 %.

Also account for the content of nitrates in the water when determining levels of nitrates that are dangerous to feed to dairy cattle. A total intake of 8 to 22 g of nitrate per 100 lbs of body weight may result in acute toxicity during periods of stress. Total nitrate intakes above 30 g of nitrate per 100 lbs of body weight can result in acute toxicity and death.

Table 1. Guide to possible safety of forages with varying nitrate content.

Nitrate Ion Content, % of dry matter	Comments
Less than 0.44%	Safe to feed under all conditions
0.44 to 0.66%	Safe for non-pregnant animals. For pregnant animals, limit to 50% of the total dry matter in the ration.
0.66 to 0.88%	Limit to 50% of the total dry matter in the ration
0.88 to 1.54%	Limit to 35 to 40% of the total dry matter in the ration. Feeds with more than 0.88% nitrate ion should not be fed to pregnant animals.
1.55 to 1.75%	Limit to less than 25% of the total ration and do not feed to pregnant animals.
More than 1.75%	Potentially toxic and should not be fed.

*Information adapted from the Penn State Dairy Reference Manual.