

Nitrate

Nitrate is the form of nitrogen (N) taken up by plants from the soil. When a crop has been subjected to frost, drought or high levels of nitrogen fertilization, nitrate may accumulate in foliage. Feeds containing high levels of nitrate can be toxic, particularly when first offered to animals not adapted to them.

Feed labs may report nitrate concentrations as Nitrate % (NO_3 %), Nitrate-N % ($\text{NO}_3\text{-N}$ %) or Potassium Nitrate (KNO_3 %). Safe, marginal and toxic levels expressed in all 3 units are given in the table below:

	NO_3 %	$\text{NO}_3\text{-N}$ %	KNO_3 %
safe	0.5	0.12	0.81
marginal	0.5 - 1.0	0.12 - 0.24	0.81 - 1.63
toxic	> 1.0	> 0.23	> 1.63

Nitrates themselves are, in fact, not very toxic. But, in ruminants, nitrates are converted to nitrites in the rumen. Nitrites, in turn, are normally converted to ammonia by rumen microbes. Nitrate poisoning occurs when the nitrite level in the rumen exceeds the capacity of microbes to perform this conversion. Excess nitrite diffuses into the blood and combines with hemoglobin to form methemoglobin, reducing the oxygen carrying capacity of the blood and subsequently starving tissues of oxygen.