

Nitrate Toxicity in Livestock Feed

Nitrate (NO₃) poisoning can be a real concern for livestock producers. Nitrate poisoning is caused by the consumption of excessive nitrate or nitrite from hay, silages or forage crops. Most plants remove nitrogen from the soil in the form of nitrate. During normal growing conditions, nitrate is quickly converted to nitrite, then to ammonia and finally broken down into proteins and other compounds. When plant growth is under stress or has been over fertilized, nitrates can accumulate in the plant.

What Causes Nitrate Poisoning?

Soil Amendments – Excessive fertilization with poultry litter or animal manure may lead to a higher buildup of nitrate in soil levels, and ultimately be taken up by the plant.

Environmental Conditions – Any condition which could slow plant growth, such as drought, frost or lack of sunlight can cause nitrate to accumulate.

Plant Age – Immature plants have a greater potential for accumulating nitrates versus older plants.

Herbicides – Applying chemicals such as 2,4-D may result in temporary high nitrate levels. Herbicides can disrupt the normal enzyme systems of plants, which can interfere with the reduction of nitrates and their conversion to proteins. Consider earlier spraying routines to control weeds early in the growing season.

Feed Nitrate Guidelines for Ruminant Animals

% Nitrate (NO₃) Ion (Dry Basis)	Risk Factors
0.0 - 0.43	Safe to feed under all conditions
0.44 - 0.65	Safe to feed to non-pregnant animals. Limit use for pregnant animals to 50% of the total dry matter in ration.
0.66 - 0.87	Limit to 50% of total dry matter in ration.
0.88 - 1.53	Limit to 35-40% of total dry matter in ration. Feed containing over 0.88% NO ₃ should not be used for pregnant animals.
1.54 - 1.75	Limit to 25% of total dry matter in ration. DO NOT FEED to pregnant animals.
1.76 +	Feeds are potentially toxic. DO NOT FEED.

Nitrate Poisoning Symptoms

Signs of nitrate poisoning in livestock are increased heart rate, muscle tremors, vomiting, weakness, excess saliva, labored breathing, staggered gait, low body temperature, disorientation and an inability to get up. Animals often lie down after a short struggle. In most cases, animals are found deceased before any signs of toxicity are known.