

## NITRATE POISONING: WHEN TO BE CONCERNED

Nitrate poisoning is a noninfectious disease condition that can affect all species consuming forages or drinking water containing toxic levels of nitrate. Range livestock are most commonly poisoned by nitrates in forages, rather than in water. Cattle are the most susceptible, while sheep are less affected, possibly because of their ability to break down nitrate more quickly than cattle. Non-ruminants are less susceptible to nitrate poisoning, but it can still be a problem in horses because of the fermentation in the cecum. The nitrite converted from nitrate by the bacteria is the real toxic culprit. So, when is there a problem of too much nitrate in a forage? Both growing and harvested forages can have problems with nitrate accumulation.

First, let's look at what species of plants have a propensity to accumulate higher levels of nitrates. To begin with, all plants take nitrogen from the soil and convert it to amino acids, the building blocks of protein. Nitrate is one of the intermediary compounds in the process. Some species of plants have a tendency to accumulate higher levels of nitrate during this process. These are the species that we need to be the most concerned with. Table 1 lists common plants known to accumulate nitrates. Most problems in the PNW occur with grain hays and weedy hays

**Table 1. Common plants known to accumulate nitrate.**

<b>Crops</b>	<b>Weeds</b>
Barley	Canada Thistle
Corn	Dock
Flax	Jimsonweed
Millet	Johnson Grass
Oats	Kochia
Rape	Lambsquarter
Rye	Nightshade
Soybean	Pigweed
Sorghum	Russian Thistle
Sudangrass	Smartweed
Sugar Beets	Wild sunflower
Sweetclover	
Wheat	

The next situation that can cause higher levels of nitrate accumulation is what I group as plant stress. This can include drought, frost, hail, and/or herbicide treatment. Not all drought conditions cause high nitrate levels in plants. In plants that survive drought

conditions, nitrates are often high for several days following the first rain. If there is a nitrate problem at the time of cutting, the resulting hay will have a nitrate problem. The ensiling process decreases the nitrate level in the silage.

Frost, hail, and low temperatures may damage, reduce or completely destroy the leaf area of the plant. A decrease in leaf area limits the photosynthetic activity of the plant, so nitrates absorbed by the roots are not converted to plant proteins, but are accumulated in the stem or stalk instead.

Herbicide treatment with phenoxyacetic herbicides (2,4,D, Banvel, MCPA, etc.) promotes rapid plant growth. Nitrate concentrations tend to be highest 3 to 5 days after herbicide application.

Fertilization with nitrogen fertilizer can be a cause of nitrate poisoning. Acute nitrate poisoning may occur if livestock consume nitrate fertilizer. Avoid grazing immediately after spreading fertilizer. Crops grown on soils that have received high applications of manure or nitrogen fertilizer may accumulate high levels of nitrate.

Any one of the above mentioned conditions can cause nitrate accumulation, but usually the problem is a result of a combination of more than one condition.

So, how do you know if you have a nitrate problem in your hay? The only real way is to have your hay tested for nitrates. This can be done at the same time and with the same sample submitted for nutrient analysis. If you suspect any problem with nitrate accumulation, it is very cheap insurance to have the hay tested for nitrates. Remember a representative sample is the most important thing to get an accurate analysis.

Once you get your analysis report back, you can tell whether you have a problem with nitrates and how serious the problem is. Different labs test for and report nitrate content differently. There are many opinions on the toxicity levels. Once you get your report back, consult with your veterinarian or County Extension Agent on the safety of your hay.

There are many good Extension bulletins on nitrate poisoning. Just do a web search using any search engine for “nitrate poisoning” or “nitrate toxicity”.

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