

The challenge of nitrates in cover crop forages

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Cover crops are reportedly good for many purposes. They can reduce erosion, fix nitrogen, add organic matter, breakup hardpans, capture soil nitrates, feed soil microbes, control weeds, and improve water infiltration. They might remove excess moisture, keep soils cool, or reduce evaporation. Hopefully, they maintain or improve our stewardship of the soil resource and result in improved cropping system profits.

Planting cover crops such as brassicas and small grains during late summer or early fall is becoming a more common and accepted practice. Often these cover crops are grazed as a forage cover crop. These species have been used as high quality forage for many years.

However, both the brassicas and small grains can accumulate high levels of nitrates.

Nitrate concentrations in excess of 20,000 ppm nitrates have been reported for these crops in recent years, especially for brassicas like turnips. Because of these high nitrate levels, many fields with large amounts of high quality, but potentially toxic, forage cover crops were left unused.

Some producers, though, did graze their forage cover crops despite the apparently high risk of nitrate toxicity. Since there have been very few reports of losses due to nitrates from using these forages, it is obvious that much remains unknown regarding toxic levels of nitrates and using high-nitrate containing forages. In particular, high quality forages with elevated nitrate levels might be grazed with less risk than currently thought. However, what might be the safe level of nitrates remains unknown.

Brassicas and small grains should continue to be considered for use as forage cover crops.

Samples of the forage should be collected and tested for nitrate content. If high levels are detected, the safest alternative is to allow these high nitrate crops to remain as traditional cover crops until the next cropping season for soil and moisture conservation.

If still used as forage, take appropriate steps to minimize losses. Risk of nitrate poisoning can be mitigated several ways. Nitrate poisoning is dose-dependent -- both the amount and concentration of nitrate in the diet as well as how rapidly it's consumed will influence the likelihood of toxicity. Grazing and feeding strategies that either reduce the amount of nitrate consumed or spread it's consumption across a longer time period will lower the chance of animals being harmed. These strategies may include any of the following:

- Begin grazing with a small number of less valuable animals that are observed carefully for signs of distress from nitrates.
- Adapt animals slowly to high nitrate forages.
- Graze pastures lightly to allow animals to selectively graze plant parts that are lower in nitrate concentration.
- Avoid feeding high nitrate forages to very hungry animals.
- Feed a probiotic that provides the rumen with microbes that convert nitrates to a non-toxic form.
- Dilute nitrate concentration by also feeding a low nitrate containing feedstuff.
- Feed grain to supply energy for rumen microbes to convert nitrate into bacterial protein.
- Feed frequent, small meals to spread out nitrate consumption.
- Ensiling forage often, but not always, reduces nitrate concentration 40 to 60 percent.
- Use extra care feeding high nitrate forage that has been ground due to rapid consumption and reduced selectivity.

If there are any concerns about the potential for nitrate toxicity, a reliable forage test will provide an indication of the management strategies needed. Even though the potential for nitrate toxicity exists, careful management can be used to reduce livestock losses.