

EM Quant Nitrate Test Strip Instructions

Sampling:
Collect 5 samples from the field or from stored forage. Test each sample with a separate test strip. For green stems cut at the recommended grazing or cutting height (typically 10 inches or 8-10 inches for sorghum sudangrass). Note: nitrate levels tend to be higher in the base vs. the upper portions of the plant. Some recommend testing half way up the stem to provide an average nitrate for the whole stem, but testing from the lower portion of the stem gives a more conservative result.

Sampling dry bales, baleage, or silage:
Take 5 random samples just like you’re sampling for forage quality. With bales use a hay probe to take samples. Follow instructions for dry material below.

Storage of the Strips:
Store test strips in a cool-dry, dark location. If the reaction zone of the test strips have changed color prior to use do not use. Test strips will react from moisture present in air, so all precautions should be taken to make sure strips are kept dry and sealed with as much air removed from bag as possible to prevent condensation.

Testing Plants from the Field:
For green stems:
Using a clean pair of pliers, squeeze several drops of plant juice from the base of the stem onto a clean surface and press the reaction zone of the test strip in the juice for 5 seconds. Wait 1 minute and then compare the test strip against the color scale provided on the photo. The darkest color means that the sample has 500 ppm (or mg/L) nitrate or higher. This material should be sent to a lab for more accurate testing before use.

For dry stems:
Chop the base of the dry stem into fine pieces and dampen (should be at the consistency of a moist sponge) and lightly press the damp material onto the reaction zone of the test strip for 5 seconds. Remove the plant material from the strip. Wait 1 minute and then compare the test strip against the color scale provided. Only use a small amount of water to prevent dilution of the nitrate concentration. The darkest color means that the sample has 500 ppm (or mg/L) nitrate or higher. This material should be sent to a lab for more accurate testing before use.

***Important***
The bottom square on the strip is the nitrate reaction zone (NO3). This is the square you should be looking at. If the test strip reacts and turns the darkest color, a forage sample should be sent to a lab for an accurate analysis of nitrate (NO3) in ppm and a feeding recommendation. The second square on the strip is for nitrite. If any nitrite is present, a sample should be sent to a lab for accurate analysis as Nitrite is significantly more toxic then nitrate. See picture for more detail.

To Order more Test Strips:
Website: Kocour.net
Product Code: EM Quant Test Strips Nitrate EM 10020


How to Read Nitrate Test Strips

Send for testing if a strip matches any of these squares.
Sampling and Shipping of Forage Samples for Nitrate Testing

The University of Kentucky Veterinary Diagnostic Laboratory has developed the following guidelines for sampling and shipping of forages for nitrate testing. Contact the laboratory you intend to use or your local county agent for more instructions.

Sample collection guidelines for nitrate testing

Proper sample collection is crucial for proper interpretation of results. The sample should represent what the animals will be eating, so collect the entire part of the plant that will be fed. Collect a number of smaller samples to form a large representative composite sample. If different regions of a field were treated differently, then separate composite samples should be submitted for each different region. Different cuttings, batches, or fields should be sampled separately, and submitted as separate samples. Preferably at least a pound of total composite sample should be submitted. More sample is better than too little, so when in doubt, collect more! Be sure to mark each bag legibly with forage/sample type and identification information.

Note: Nitrate concentrations tend to be higher at the base of the plants, and higher in the stalks than the leaves. Grains, seeds and leaves do not accumulate significant nitrate levels. Plants with high stem-to-leaf ratios are the most likely to cause nitrate intoxication.

Dry forage (hay, bedding) – Use a hay probe to take core samples. Randomly select 10 or more bales that are representative of a cutting/batch. Take one or more core samples per bale, and mix all the cores to make one large composite sample.

Silage, balage, haylage – Use a hay probe to take core samples if possible. Randomly select 10 or more bales that are representative of a cutting/batch. Take one or more core samples per bale, and mix all the cores to make one large composite sample. Reseal the hole created in the wrap with tape after sampling. For bagged silage, select at least 10 areas to sample that are representative. If core sampling is not possible, unload some silage material and collect large handfuls from 10 or more different locations. Mix to form a large composite sample.

Corn stalks – Cut the stalks at the anticipated harvest level and submit the entire part of the stalk that will be fed. Collect stalks from several areas of the field. 5-10 stalks are recommended. Stalks can be cut or folded prior to shipping. Alternatively, if the corn stalks are going to be chopped, you can collect representative samples from the fresh chop. Or, if shipping volume is an issue, only the bottom halves of the stalks could be submitted, but remember that the result will be higher than the actual overall average nitrate concentration for the entire plant.

Pasture grasses – Collect handfuls of forage from 10-20 different areas in the field. Cut the grass at the anticipated harvest or grazing height and submit the whole part of the plant that will be ingested. Mix thoroughly to make one large composite sample.

Note: Grains do not accumulate nitrate, so nitrate testing is not typically performed on grains.

Sample storage and shipment guidelines

Moist samples (eg, fresh green grasses, silage) should be placed in plastic bags and immediately put in a cooler on ice or ice packs. These samples should be kept chilled or frozen until shipment, and should be shipped with ice packs. Dry samples such as relatively dry corn stalks and hay should be placed in paper bags and kept at room temperature until shipped; ice packs are not needed for shipment of dryer samples. Regardless, samples should be shipped as soon as possible after collection to decrease the risk of reduction of nitrate levels. Samples should be shipped overnight, or delivered directly to the laboratory. Note: Storage of moist plant samples in plastic bags at room temperature will result in bacterial growth and reduction of nitrate, resulting in inaccurate nitrate results.
Nitrate Poisoning in Livestock

From: Ray Smith (Department of Plant and Soil Sciences), Jeff Lehmkuhler (Department of Animal and Food Sciences), Cynthia Gaskill and Michelle Arnold (Veterinary Diagnostic Laboratory)

Nitrate and nitrite poisoning may be considered as one entity. When nitrates are ingested, they are reduced to nitrites in the rumen before being absorbed from the digestive tract as microbial proteins. Nitrate poisoning in ruminants may occur as a result of consumption of nitrate fertilizer or forage with a high nitrate content. Cattle with access to nitrate fertilizers, especially when deprived of salt, may consume toxic quantities. Cattle consuming plants containing excessive amounts of nitrates cannot convert the nitrates to protein without accumulation of nitrite. It is the rapid formation and absorption of large quantities of nitrite that causes poisoning.

Few plants normally contain high nitrate levels. Under normal growing conditions, roots of forage plants absorb nitrate from the soil. Shoot tissues then convert nitrate into plant protein. Under certain conditions, such as high nitrate fertilization, drought, or sudden weather changes, plants can develop potentially dangerous nitrate levels. Highest levels of nitrate tend to be found in the stems where nitrate reduction normally occurs, and not in the leaves. Ensiled forage crops high in nitrates may have the nitrate content reduced by up to 60% with proper fermentation. There is little reduction of nitrate in dried hay. Common crops in Kentucky that may accumulate nitrates include corn, wheat, sudangrass, rye, millet, alfalfa, soybeans, and oats. Common weeds that are nitrate accumulators include ragweed, pigweed, thistle, bindweed, jimsonweed, and johnsongrass. These are not complete lists but these forages cause the most problems within the state.

Nitrate in water sources may also poison livestock. Surface water or water from shallow wells may contain nitrates, especially if there is run-off from fertilized land contaminating the water. Both water and forage should be analyzed to ensure that total nitrate does not exceed toxic levels.

Cause: Nitrates, when consumed more rapidly than they can be converted to protein, enter the bloodstream as nitrite. The absorbed nitrites combine with hemoglobin of red blood cells to produce methemoglobin, a form incapable of transporting oxygen. Death occurs as methemoglobin levels approach 80%.

Signs: The first sign of nitrate poisoning is usually the sudden death of one or more animals. Oxygen deprivation (asphyxiation) results from the tying-up of hemoglobin. Signs include rapid, labored breathing; rapid, weak heart beat; staggering; muscle tremors; and recumbency (downer). Affected animals typically show signs of poisoning within 6-8 hours after consumption of a toxic dose of nitrates. Examination of the mucous membranes, especially the vaginal mucous membranes, may reveal a brownish discoloration that occurs well before other clinical signs. Venous blood also has a chocolate brown discoloration. Death can occur within 2-10 hours depending on the quantity and rate of
absorption of nitrite and the amount of stress or forced exercise the animal is subjected to. Pregnant cows may abort following recovery from nitrate poisoning.

Prevention: Nitrate fertilizer should be stored where cattle do not have access to it and accidental spills should be cleaned up promptly. Avoid grazing warm season grasses fertilized with high amounts of nitrogen when growth ceases due to drought or cold damage. Corn should be properly ensiled at least 3 weeks and tested for nitrates before feeding. Do not green chop forages suspected to be high in nitrates. Cool season grasses and small grain pastures that have been heavily fertilized with nitrogen may be high in nitrates during early spring when cool, overcast days retard growth. All suspected forages should be tested for nitrate levels. Consult your County Extension Agent for Agriculture for information concerning sampling, sample preparation and location of a testing laboratory. Forage with high nitrate levels can be mixed with forage known to be low in nitrate to reduce the risk from feeding. Feeding low nitrate forage or hay before turning cattle on to high nitrate forages will reduce the amount of nitrate consumed. Cattle have the ability to increase their tolerance to nitrates in their diet with time. To aid in increasing this tolerance, the diet should be sufficient in vitamin A and the trace minerals normally contained in trace mineral mix. A gradual increase in the total energy content of the ration enhances metabolism in the rumen and helps cattle tolerate higher nitrate levels in their diet.

Treatment: Animals showing signs of nitrate poisoning should be removed from the source of toxicity and a veterinarian should be contacted immediately. Administration of a 2% solution of methylene blue intravenously by the veterinarian will aid in converting methemoglobin back to hemoglobin. Mineral oil or other emollients may be given to protect the lining of the digestive tract. Vinegar given orally via stomach tube will help prevent nitrate reduction in the rumen.