

Forage Nitrate Strip Test Instructions

Adapted from Auburn University Forage Nitrate Test Kit Instructions

Materials needed:

- Coffee grinder or kitchen blender
- Metal pan
- Portable electronic balance
- 250-ml plastic bottle
- Distilled water
- Paintbrush
- Table knife
- Nitrate test strips (we recommend Quant-o-fix Nitrate Test Strips or EMD Millipore Nitrate Test strips)
- 100 mL graduated cylinder

Procedure:

1. Make sure that the kit contains all the components listed above.
2. Collect a sample of hay that represents the forage eaten by the animals. This can be either collected from bales using a hay probe or by breaking the bale and collecting portions of hay from several locations throughout the bale. If collected without using a hay probe, cut the forage into approximately 1 to 2-inch pieces.
3. For fresh forage samples collect the portion of the forage plant intended for harvest. Chop fresh forage into 1 to 2-inch lengths for easy handling. Spread forage thinly in a single layer onto a microwave-safe dish and microwave on high for 2-minutes. If the forage is not completely dry, continue to heat using 30-second intervals until dry. Charring can occur if the forage is heated too rapidly. Lessen the chance for charring by placing a microwave-safe cup containing water in the oven along with the forage sample. The forage will be dry enough for grinding when the plant material can be crumbled between the thumb and forefinger.
4. Place the dry, chopped hay into the coffee-grinder and grind until the grain fineness is similar to granular sugar or salt. The grinder will produce a more consistent grind if the hay is placed loosely into the mill and ground using short-pulsing actions until larger stems are reduced. Grasses with seed heads will resist a homogeneous grind; however, take care to grind these fibrous grasses as thoroughly as possible. Use the paintbrush to remove the dust from the grinder.
5. Repeat step number 4 until the entire sample has been ground. Place each batch of ground hay into the metal pan and mix.
6. After the entire sample has been ground through the coffee-grinder and thoroughly mixed, weigh 1.0-g of the ground hay into the 250-ml plastic bottle. It is important to place the balance on a stable and level surface that is unaffected by wind. Place the 250-ml bottle on the weighing platform, allow the weight reading to stabilize, and then press the **tare** button to zero the balance. Using the table knife, weigh 1.0-g of ground hay into the bottle.

7. Place 100-ml of low nitrate tap water into the 250-ml plastic bottle that contains the 1.0-g of ground hay. Low nitrate tap water can be confirmed beforehand by checking with one of the nitrate test strips. Dip the end of the test strip with the small felt patch into a calm tap water sample for 2-seconds, remove, wait 2-minute, and within 10-seconds match the color of the felt patch to the color scale on the side of the test strip bottle. No magenta color should develop if your tap water is suitable to use. If any magenta color appears, find another source of water.

8. Tightly cap the 250-ml bottle that contains the 1.0-g of hay and 100-ml of water, shake vigorously for approximately 30-seconds, and allow the hay to soak for 30-minutes. During the soaking process briefly shake again every 10-minutes.

9. After 30-minutes of soaking, dip a test strip into the liquid for 2-seconds, remove, and shake away any hay particles that prevent you from seeing the color development on the felt patch. Wait 1-minute and then match the color to the scale on the side of the test strip bottle within 10-seconds. To convert the PPM scale on the bottle to forage nitrate concentration in PPM, multiply the bottle scale by 100 (see Table 1). If no magenta color develops or the color is lighter than the color corresponding to 10 PPM on the bottle color scale, the forage nitrate concentration is less than 1000-PPM nitrate.

Table 1. Conversion from Precision™ test strip value into forage nitrate.	
Test Strip Reading (mg/L NO3-)	Forage Nitrate (mg/L NO3-)
0	<1,000
10	1,000
25	2,500
50	5,000
100	10,000
250	25,000
500	50,000

Making Decisions Using Test Kit Results

Once you have obtained results from the strip test, you then can make decisions on how best to use the forage. You may want to verify results with a commercial lab. Please refer to “Nitrate Toxicity of Montana Forages” MT200205AG for further instructions on safe feeding levels and management.