

## Forage Nitrate Test Kit Instructions

### Kit Contents:

- Pruning sheers
- Coffee grinder
- Metal pan
- Portable electronic balance-  
<https://balance.balances.com/scales/13>
- Paintbrush
- Table knife
- Nitrate test strips
- <https://sargentwelch.com/store/product/8884688/prcision-test-strips>
- 100-ml graduated cylinder
- 250-ml plastic bottle

### 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 NO <sub>3</sub> <sup>-</sup> )	Forage Nitrate (mg/kg NO <sub>3</sub> <sup>-</sup> )
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

Table 2 contains forage nitrate ranges and accompanying guidelines for managing the forage ration. Generally, as forage nitrate increases the fraction of the nitrate containing forage should decrease in the overall ration. When using this field test kit, do not rely completely on field test results. This kit is intended to help locate sources of high nitrate forage and provide quick information for making the management decisions listed in Table 3.

**Table 2.** Guidance for evaluating the level of nitrate in forage fed to beef cattle.

Forage Nitrate (mg/kg dry forage)	Guidance
<4500	Safe to feed with adequate feed and water
4,500 to <6,500	Safe under most conditions, but if feeding pregnant animals restrict to half (1/2) ration
6,500 to <9,000	Limit to half (1/2) ration
9,000 to <15,000	Limit to third (1/3) ration
15,000 to <18,000	Limit to quarter (1/4) ration
>18,000	Potentially lethal, very risky, dilute carefully

**Table 3.** Decisions using field nitrate test kit when feeding beef cattle.

Forage Nitrate from Table 1	Decision
>10,000	Stop or do not feed until results are obtained by laboratory analysis
>5,000 but <10,000	Feed cautiously, half (1/2) ration until results are obtained by lab analysis
<2,500	Safe to feed but make sure that the sample was representative