



CSU SPUR
COLORADO STATE UNIVERSITY



INSTRUCTIONS TO COLLECT AND SUBMIT FORAGE SAMPLES

Forage testing provides essential information about the **nutritive value** of forage. These results can be used to adjust the amount and type of nutritional supplements offered to livestock consuming the forage.

Proper forage sampling is critical for obtaining accurate measurements of **nutrient content, mineral composition, dry matter**, and the overall **value of any feedstuff**. Correct sampling and analysis are especially important under conditions that may increase feed variability, such as challenging growing seasons or inconsistent harvest conditions.

Forage may be sampled **in the pasture, after harvest and baling, or before and after ensiling**. All forage and feed samples should be **stored in a freezer** until they are shipped for analysis. To reduce the risk of mold growth or spoilage during shipping, ensure samples arrive at the laboratory **as quickly as possible**.

Tools

1. **Core sampling probe (hand- or power-operated)**

A forage probe attached to a drill makes bale sampling quick and efficient, minimizes leaf loss, and allows access to the bale's interior for a more representative composite sample. Forage probes can be purchased online or from farm supply stores or borrowed from most Colorado State University Extension offices.

Using a **core sampling probe** provides the most accurate and reliable sample.



2. **Clean bucket**

Use a clean bucket to collect and combine the individual core samples taken from the hay bales.

3. **Cloth or plastic bag (e.g., gallon-size Ziplock)**

Use a sturdy cloth or plastic bag to hold the final composite sample before submission.

4. **Permanent marker**

A permanent marker is needed to clearly label the sample bag with your name, sample ID, and any other required information.

Forage should be sampled as close to the time of feeding or sale as possible. Laboratory processing typically takes **5 to 7 business days**, depending on the tests requested, the analytical methods used, and the overall volume of samples received.

Hay quality depends on many factors, including **forage species, stage of maturity, cutting schedule, soil type, soil fertility, presence of weeds, harvest conditions, and storage conditions**.

When sampling hay, ensure that all samples are taken from the same **“lot”**. A *lot* refers to hay produced under **uniform conditions**, such as the same field, the same forage species (or forage mix), the same cutting, and the same stage of maturity.

Quartering a Sample

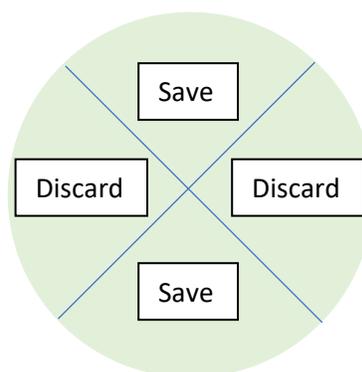
Quartering is used to reduce a sample to a smaller, more manageable size **without introducing bias**.

Before quartering, **forage samples collected by hand** must be **cut into 2- to 3-inch pieces** using shears or scissors and **thoroughly mixed**. Take care to prevent leaf loss during cutting and mixing. **Cored samples** may be mixed **as is**, without cutting.

To quarter the sample:

1. Pour the entire sample evenly onto a **clean surface**, preferably paper, plastic, or another smooth material.
2. Gently **level the pile** into a uniform, flat shape.
3. **Divide the pile into four equal quarters** (see diagram).
4. **Select and retain two opposite quarters**, ensuring you include fine material, as these contribute significantly to nutrient content.
5. If the retained portion is still too large, **repeat the entire quartering process** until the sample is reduced to the appropriate size and fits into the sample bag.

Always use the **quartering method** when reducing sample size to ensure you obtain a **representative sample** for laboratory analysis.



Sample Collection

1. **Small Square Bales**



a. **Core Sampling**

Select a minimum of **20 random bales** for coring. Using a hay probe, collect a **12- to 18-inch core** from each bale by inserting the probe **into one end of the bale at a right angle** to the surface. This ensures the core reflects the internal composition of the bale.

b. **Hand Sampling**

If hand sampling, reach inside each bale and remove a **handful of forage**. Cut the

forage into **2- to 3-inch pieces** using shears or scissors. Combine all **20 samples** in a clean bucket and **mix thoroughly** to create a representative composite sample.

2. **Large Round Bales**

a. **Core Sampling**

Select a minimum of **20 random bales**. From each bale, collect **two cores** (12 to 18 inches long) from locations around the **circumference** of the bale. Combine all cores in a clean bucket and **mix thoroughly** to create a representative composite sample.



b. **Hand Sampling**

To hand sample, reach inside each bale and remove **two or three handfuls of forage** from different locations around the bale. Take care to **avoid leaf loss**, as leaves contain most of the nutrients. Cut the collected forage into **2- to 3-inch pieces**, combine all samples in a clean bucket, and **mix well**.

3. **Large Square Bales**

a. **Core Sampling**

Select a minimum of **20 random bales**. Collect **two cores** (12 to 18 inches long) from **each bale**, one from **each end**, by inserting the probe at **right angles to the bale surface**.

b. **Hand Sampling**

To hand sample, reach inside each bale and remove **two or three handfuls of forage** from different locations. Take care **not to lose leaves**, as they contain most of the nutrients. Cut the grab samples into **2- to 3-inch pieces**, combine them in a clean bucket, and **mix thoroughly** to create a representative composite sample.

4. **Sampling Standing Forage**

Standing forage is sometimes tested to determine whether it is suitable for cutting as hay or whether grazing animals will require supplemental feed. Select at least **eight random locations** within the field and clip the forage at **grazing or harvesting height** from a **one-square-foot area**

at each location. In grazing situations, try to sample the species that animals are **selectively grazing**, as these are most representative of nutrient intake.

Cut the collected forage into **2- to 3-inch pieces**, combine all subsamples in a clean bucket, and **mix thoroughly**. Spread the composite sample on **clean paper** and allow it to **air-dry for two to three days**.

Avoid mailing wet samples, as **mold may form during transit**.

5. Sampling Forage for nitrate

a. Select bales from hay suspected of containing elevated nitrate levels.

Sample these bales using the **coring procedures outlined previously**, ensuring that cores are taken correctly and combined to form a representative composite sample.

b. Field Sampling

When sampling fields for suspected high nitrate levels, clip at least **20 random plants** at **grazing height** from the affected area. Cut the plants into **2- to 3-inch pieces**, combine the pieces in a clean bucket, and **mix thoroughly** to create a representative composite sample.

6. Silage Sampling

7. Silage samples can be collected from the **face of a bunker silo** as it is being fed, or from the **unloader of an upright silo**. For **bagged silage**, cut several small slits along the side of the bag and insert a hay sampler through the openings to collect material from different locations. This helps ensure that the final sample is representative of the entire bag.

a. Fresh Cut

Sample silage when the moisture content of the forage going into the silo is **between 64% and 72%**. Test results from fresh silage collected at this moisture range will closely reflect those obtained after fermentation.

Collect **two to three gallons** of silage from **different sections of a load**, then combine and **mix thoroughly**. Retain **about one quart** of the mixed material. Refrigerate or freeze this quart until all loads have been sampled.

Once samples from all loads are collected, **combine them**, mix thoroughly again, and save **one quart** as the final composite sample. Place the final sample in a **cloth forage sampling bag**, then put the cloth bag into a **plastic bag** to prevent moisture loss during shipping.

Before mailing, **freeze the sample**. Ship samples **early in the week** to avoid weekend delays and reduce the risk of **mold formation** during transit.

b. Upright Silos

If a **silos unloader** is used, collect at least **12 handfuls of silage** as it is discharged from the silo. Avoid sampling the **top or bottom 2 to 3 feet**, as these areas often contain

unrepresentative, moldy, or otherwise damaged material. Place the collected silage in a **clean plastic container**, mix thoroughly, and use the **quartering method** described earlier to reduce the sample to approximately **one quart**. Place the final sample in a **forage sample bag** and mail it following the instructions for fresh-cut samples.

If an unloader is **not** used, the same **hand-grab technique** can be applied to silage that has been thrown down for feeding. Silage can only be sampled to the depth a person can safely reach; therefore, the resulting sample represents **only that portion of the silo**. Other sections of the silo may contain silage of **different quality**, so caution should be used when interpreting results.

c. Horizontal Silos

Collect samples using the **hand-grab method**. Take grab samples from **multiple locations** across the entire exposed face of the silo to ensure the sample represents the full range of material being fed. Combine all grab samples in a clean container, **mix thoroughly**, and use the **quartering method** to reduce the sample to approximately **one quart**.

Prepare Sample for shipping

1. **Completely fill out the Feed and Forage Submission Form.**
Ensure all information is accurate and complete.
2. **Submit approximately ½ gallon of sample.**
This amount allows the laboratory to perform all requested analyses.
3. **Label the sample bag clearly.**
Use a permanent marker to write the **sample ID or name** and your **contact information** directly on the bag.
Make sure the information on the **sample bag** exactly matches the information on the **Forage Submission Form**.
4. **Ship samples promptly.**
Collect samples **later in the afternoon** and ship them the **same day via overnight delivery** to minimize spoilage and maintain sample integrity.
5. **Seal and mail or deliver the sample.**
Place the sample bag and submission form in a sturdy box, seal it securely with packing tape, and mail or drop it off at:

Soil, Water, and Plant Testing Laboratory

Terra Building, Room T 3-16
4789 National Western Drive
Denver, CO 80216

Payment

Payment is expected at the time of sample submission. Purchase orders are accepted for city offices, landscape companies, crop and environmental consultants, schools, and universities.

When samples are **mailed**, they must be accompanied by a **check or money order** made payable to **Colorado State University** for the total amount due. If samples are received without payment, laboratory personnel will attempt to contact the customer to obtain payment before processing. Samples will be held for **up to two weeks** while awaiting payment; after this time, they will be **discarded** if payment is not received.

If samples are **dropped off in person at the laboratory**, payment may be made by **credit or debit card**.

For questions regarding purchase orders, invoicing, or payment, contact the SWPTL at **soiltestinglab@colostate.edu** or by phone at **970-491-5061**.