

Collecting a Forage or Feed Sample for Analysis

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Knowing how to properly collect a forage or feed sample for analysis is vital to obtaining the best overall estimate of forage or feed nutrients. The proper equipment, timing, and placement of samples will help to ensure that you get the best description of your feed and forage quality.

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KNOWING WHAT IS IN LIVESTOCK FORAGE IS AN integral part of knowing what livestock are eating, and whether nutritional needs are being met. Forage should make up the basis of most equine and livestock rations, with the exception of animals that are being fed in a feedlot. The ability to develop a ration catered to animals' needs revolves around the ability to know what is in the feedstuffs animals are consuming.

Forage Sampling

Proper forage sampling is essential in obtaining an accurate representation of the forage for analysis. Forages may be sampled in the pasture, after harvest and baling, or pre- and post-ensiling and should be a representative sample of the entire "lot." Having a representative sample can help in estimating the nutrient distribution and variation across the field/pasture and during harvesting.

A "lot" of hay (or silage) should be fairly uniform, and is usually taken from a single pasture or hay stack. The forages in a lot are usually at the same stage of maturity, have had similar management, and are expected to have similar amounts of anti-quality factors, such as mold, weeds, or rain damage. If there is a large variation in a single lot in terrain (i.e. sloping hills or river bottoms), management, or anti-quality components, it is recommended that multiple samples be taken to best represent that particular allotment of forage.

Sampling Equipment

Proper forage sampling equipment includes a forage probe, a bucket, Ziploc sample bags, and drill (depending on the type of probe). A forage probe that can be connected to a drill (Figure 1) makes quick work of sampling bales. Using a forage probe minimizes leaf loss compared with using your hands, and increases the

ability to reach forage in the bale's interior that would otherwise be inaccessible from an unopened bale. Forage probes can be purchased from farm supply stores or contact your local county Extension agent for forage probe availability from their office. The bucket is used to collect the individual samples collected from the lot. The individual samples are mixed to create the composite sample needed to send off for analysis.



FIGURE 1. Picture of a typical mechanized hay probe set up, including the drill, probe, and dowel for removing the forage sample.

Sampling Baled Hay

Large Round Bales

When sampling large round bales, at least 10% of the bales in a lot should be selected. Collect two core samples from each bale. Forage samples should be collected from the circumference of large round bales (Figure 2) to receive the most representative sample.

Square Bales

A minimum of 10% of the bales should be selected as the representative sample of the lot. Core forage samples should be collected perpendicular to the bale surface on the small end of the bale (Figure 3). Two core samples can be collected from large square bales similar to the large round bales, and one core sample is sufficient for small square bales.

Sampling Standing Forage

Sampling and analyzing standing forage will help to determine if a field is adequate to cut for hay or to determine if any supplemental feed is required during grazing. Clipping sites should be selected randomly throughout the field to provide a representative sample. The easiest way to achieve this is to walk in an “M” pattern (Figure 4) throughout the field, harvesting samples at regular intervals. For a small field, this might mean every 20 steps, for a large pasture or field this might mean every 50 steps. Sample number should be increased for larger fields in order to obtain a better average. If there are large variations within the field, because of proximity to a water source running through or a hillside, multiple

samples should be sent to the lab for best representation of the variations within the field.

The forage should be clipped from a one square foot area at harvesting or grazing height at each site. After clipping each site, cut the samples into 3-inch pieces and place them in your sampling bucket. Mix all of the samples together in the sampling bucket to create a representative sample. Samples can then be spread out on paper to air dry for two days or can be frozen prior to shipment for analysis. These will minimize any molding that may occur during shipment to the laboratory.

Sampling Silage

Fresh Cut

Sampling chopped silage prior to it being placed in a bag, bunker, or silo provides ample time for analysis prior to feeding. If packed and stored properly, silage crude protein and fiber remain stable during fermentation. Therefore, having the analysis information early will allow for adequate timing to plan for any additional feeds and supplements required. Studies have shown that higher quality forage prior to ensiling resulted in higher quality silage, compared to lower quality or more mature forage that has gone through the same fermentation process. To ensure proper sampling prior to ensiling, multiple samples should be taken from each chopper wagon or truck load. Distribution of stems, leaves, or grain is not uniform throughout the load. Leaves tend to gather on the sides and at the back of the chopper wagon and stems tend to bunch at the center of the wagon. Four to five handfuls of silage should be collected from each



FIGURE 2. Forage sampling round bales. Collect sample from the curved side. The probe should be perpendicular to the surface.

FIGURE 3. Forage sampling small square bales. Collect sample from the small end of the bale.

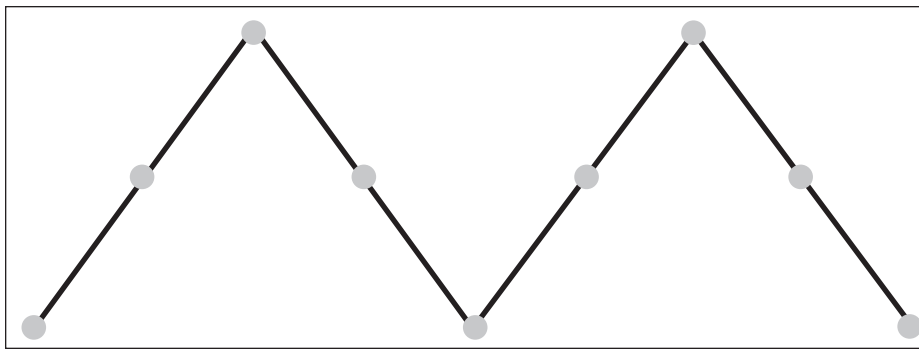


FIGURE 4. Recommended sampling pattern for fresh forage analysis in a uniform pasture. “Dots” represent sampling sites within the pasture.

chopper wagon or truck. The samples should be collected from the middle of the load as it is unloading, this will provide a representative sample of stems, leaves, and grain. Samples should be immediately placed in the refrigerator or freezer. Once an entire field is harvested, mix all of the subsamples together in one sample bag and freeze.

Upright Silo

Sampling should take place after fermentation is complete after being placed in the silo. This can take several weeks for the entire process to occur and a stable pH to be achieved. To collect a representative silage sample from an upright silo, do not sample from the top or bottom two to three feet of silage. Removing the spoilage from the top and bottom of the silo will provide a better sample for analysis. When using a silage unloader, grab 10-12 handfuls or one to two pounds of silage from the unloader while it is running. Caution should be taken to avoid any hazards, and equipment should be turned off before reaching in to obtain a sample. Samples should be sealed tightly in a sample bag and stored in the freezer until shipping.

Silage Bunker

It is not recommended to take samples from the face of the bunker, this will not yield a representative sample and creates safety concerns, such as the collapse of the silage wall. Samples obtained from the face of the bunker can result in highly variable estimates of crude protein and fiber content. The best way to obtain a sample from a bunk is to use a face shaver or loader bucket to scrape across the face similar to removing silage for feeding. Then create a pile of silage on the bunker floor. Collect six to eight hand grab samples from the pile on the floor. Mix well in the sample bucket and take a hand grab sample for analysis. Store the sample in the freezer until shipment.

Silo Bag

Hand grab samples can safely be obtained from the silage face when stored in a silo bag. After silage is removed from the bag, creating a fresh silage face, collect five to

eight hand grab samples across the entire silage face. Mix the samples together in the sample bucket and place a representative sample in the sample bag. Immediately freeze after collection.

Core samples can also be taken from silo bags. Approximately 8-10 core samples should be collected from a silo bag along the entire length and both sides of the bag. Securely tape the core holes closed after collecting the sample to prevent oxygen infiltration and spoilage. Similar to the hand grab samples, mix samples in the sample bucket and collect a representative sample in a sample bag for analysis. Freeze immediately upon collection.

Sampling Total Mixed Rations (TMR)

Collecting a representative sample of a TMR is a fairly straightforward process. Mix the TMR using normal procedures and distribute in the bunk as normal. Collect hand grab samples along the entire bunk line from the top, middle, and bottom of the TMR and place in the sample bucket. The sample bucket should be about $\frac{2}{3}$ full when all of the samples have been collected. On a smooth, clean surface, dump the bucket of the TMR samples out and leave the coned sample intact. Using a yard stick or thin piece of wood, cut the sample in half, and then half again, which creates a representative sample. Keep this quarter of the sample for analysis.

Sample Handling

All forage and feed samples should be stored in the freezer until shipping for analysis. To minimize the chances for mold formation or spoilage during shipping, ensure your samples arrive at the laboratory as quickly as possible. It is not a good idea to allow samples to sit outside, especially in the sunlight, during the day.

For any of these forage types, a sample of approximately 0.5-1.0 lb is usually sufficient for most labs. However, it is always a good idea to check with the lab to in order to ensure there is adequate sample available. Some labs even provide a sample collection bag.

Conclusion

Proper sampling is important when trying to determine forage nutrient quality. Once you have obtained an adequate, representative sample, the next step is to send it to a certified forage testing laboratory for analysis. Directions on how to interpret a forage analysis can be found in the MontGuide, *Forage Analysis Interpretation* (MT201609HR). For a complete list of current certified forage testing labs, visit the Forage Extension website at <http://animalrangeextension.montana.edu/forage/>.



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