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Sampling Feed for Analysis

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Warning

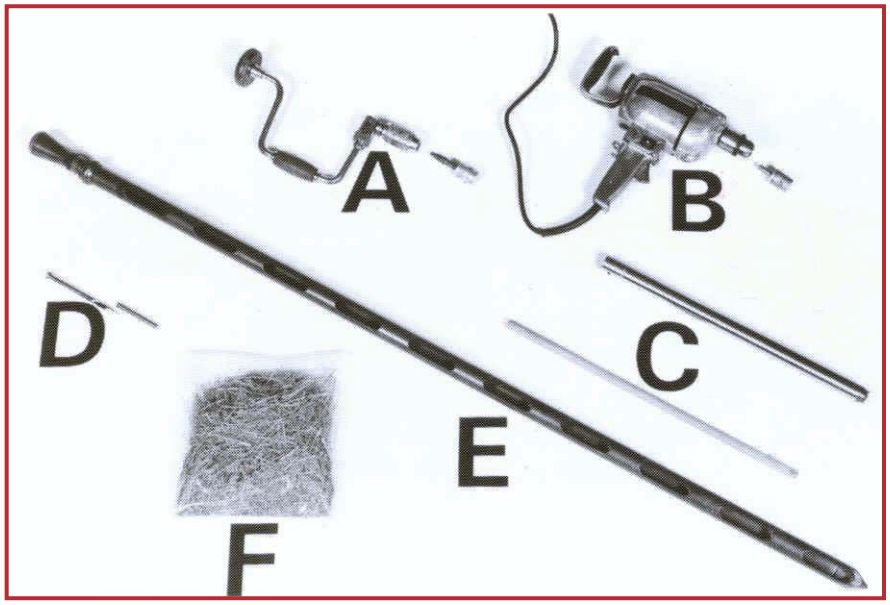
A chemical analysis can be no better than the sample submitted. Make sure the sample is representative of a selected lot of feed. Remember: Know what analysis you need and inform the laboratory. *See your county Extension office for a current listing of labs.*

Proper handling of the sample between the farm and laboratory ensures best results. General rules are:

- **Sample size:** minimum of 1 quart (be sure the sample is representative). All forages should be chopped to a length of 3 inches or less to make handling easier.
- **Pack tightly to exclude air.** Seal air tight. Use plastic bags in all cases except for very dry samples.
- **Send samples to the laboratory as quickly as possible.** Indicate analysis wanted by letter or with appropriate form, if part of an organized program.
- **All letters, instructions, checks or money orders should be put in first class mail envelope and attached to mailing container.** The sample container can go as fourth class mail.
- **Address both letter and sample container with correct laboratory address and return address.**

Baled Hay

With a commercial forage sampler (for example the Penn State sampler), core subsamples from 15 to 20 bales should be used for the composite lab sample. The bales should be selected at random for each lot of hay. If the hay will be fed by its cutting (first-cutting alfalfa, etc.), each cutting should be analyzed. If a mixture of cuttings or classes of hay will be fed, a proportional number of bales can be used from each class to approximate the feed offered to the animals. For square bales, sample from the end and use the full length of the sampler tube. Place each core in the container. For round bales, sample across the bale at the center.



Equipment for Sampling

A. Ratchet brace and square shank adaptor
B. Electric drill and round shank adaptor
C. Penn State forage sampler with dowel plunger to remove moist or packed samples
D. Sack thief
E. Grain probe
F. Plastic bags for submitting samples

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You can sample baled hay without a forage sampler by removing a small section from each bale (15 to 20 bales) and cutting the hay into 3-inch lengths with shears or a hatchet. This is a less desirable technique because you're almost sure to lose leaves. Make every effort to include the appropriate combination of leaves and stem. Mix and then randomly grab handfuls of the chopped sample. Place them in the container to be sent to the laboratory.

Loose Hay

Using the commercial forage sampler or equivalent, place the hay sample beneath your feet to compress the hay and sample it between your feet for the full depth of the sampler. Random samples from the side of the mow or stack should be taken where the hay is compressed enough for good sampling. An extension shaft on the sampler can be used to sample deeper into the hay. Take at least 15 core samples.

You can sample loose hay without a forage sampler by removing a handful of hay from many (15 to 20) positions from each lot of hay. Be careful to save all leafy material belonging to the sample. Cut into 3-inch lengths, mix and send a representative sample to the laboratory.

Pasture

Pasture sampling is most difficult. Fertility and moisture differences in a single pasture add to the problem. Sample by picking eight to 10 locations at random. Remove the forage from a square foot area at grazing height. Mix all the collected forage and take a representative sample for analysis.

A second sampling method is to take forage being selectively grazed by the animals at several locations. This is a preferred method in unimproved pasture where selective grazing is evident. However, to accurately determine how much of which forage to sample can be difficult. With a little practice, an experienced manager can accurately identify the species being consumed at the time of sampling.

Precaution

Green pasture samples should be dried or frozen immediately to prevent marked chemical changes. The most practical alternative is to pack the sample tightly in a plastic bag, exclude all possible air, freeze and promptly mail to the laboratory. With good container insulation, the sample will arrive in a cool condition or with a minimum of a silage like fermentation.

When choosing to dry a sample, take care to control the temperature and time the sample is exposed to heat. Drying for too long or at too high a temperature will alter the composition of your sample significantly. The microwave can be an excellent tool for drying samples.

Forage Crops in the Field

Remove the plants from a square foot area at normal harvesting heights at several (eight to 10) locations in the field. Whenever possible, chop the forage into small pieces (1 to 2 inches), mix and remove a representative sample. This sample should be handled as noted in the precaution section under pasture. Where you want nitrate and cyanide analysis, a field check should be made or the sample quickly frozen (use dry ice when possible) and transported to the laboratory in a frozen state. The time from chopping to freezing should be less than 15 minutes for cyanide. However, the whole plant can be transported to the laboratory within two hours with little loss.

Green-chopped Forages

A plastic bag can be filled by randomly grabbing a handful of the chopped material from the cutter, blower or several locations in a wagon or truck. Because the material will be fed as such or ensiled, the plastic bag should be packed tightly, sealed with air excluded and sent to the laboratory immediately. The fermentation will reduce nitrate content and slightly modify other components, but this change can be considered minor and in the direction of its ultimate feeding value. When more exact values are required, the sample should be frozen before transporting.

Silage

All silage samples should represent several locations in the silo to ensure a representation of the silage. The representative sample must be packed tightly in a plastic bag, with all air excluded, and sealed. The sample should be sent to the laboratory as soon as possible.

Trench Silo

If the silo is open, the face of the silage should be cleaned off in the center. Remove a column of silage 6 inches by 12 inches from top to bottom, mix it thoroughly and then take a representative sample. If the silo is not opened, dig a series of (four to six) holes from the top with a post hole digger or suitable equipment. Spoiled silage should be placed beside the hole to be returned after sampling. Mix the samples of good silage from each hole and a take a representative sample. Be sure holes are packed tightly with the silage that has been removed to avoid undue spoilage.

Upright Silo

Representative sampling is difficult. An open silo can be sampled by taking grab samples from a given day's feed. If unopened, use a procedure similar to that suggested for the unopened trench. Silage and haylage moisture (percent dry-matter content) can vary considerably from one level to another in upright and horizontal silos. Due to many reasons, such as the date of chopping, rainfall and differences in fields, this factor is important when allowing for the nutrient and fiber content in the diet.

Because silages and haylage are more variable in their dry-matter content than feeds stored in the dry form, continuing to monitor their moisture level on a regular basis during the feeding period is important. The testing interval, however, will depend on how fast the silo is emptied. For instance,

if the silo is fed out quickly, samples taken whenever 20 to 25 percent of the contents are removed should be sufficient to monitor variations in moisture and nutrient content. Even if the silage remains in the silo for extended periods, its composition changes with the fermentation process. In this case, samples taken every four to six weeks of the feeding period are advisable.

Regardless, a silo should be sampled more than once during the feeding period, especially when more than one field or kind of forage is stored in the silo. Both the microwave method and the commercial moisture testers can provide quick and reliable results to help you make the appropriate adjustments for a balanced ration.

Sacked Feed

Most sacked feed is mixed thoroughly. However, we recommend that you sample at least five to six sacks (1 to 2 pounds), mix the samples and submit a representative sample (1 pound) for analysis. Either a small probe or sack thief should be used when available. Be aware that settling is quite common, even in sacked feed, making thorough sampling important.

Bulk Concentrates

Commodity feeds should be analyzed as a composite of at least 10 to 15 areas of a given lot of feed. When mixing the composite, avoid segregation by particle size or the true sample value may be distorted. At least 1 pound, or a quart of material, should be sent to the laboratory. Be advised that these results represent bulk averages and will not give you information on the uniformity of nutrient content in the mix. If you're experiencing inconsistent herd performance using these feeds, the uniformity of the mix may be questionable, so you should employ a different technique. Taking several samples of the commodity and having each analyzed will allow the producer or feed nutritionist to do a better job of adjusting the ration to accommodate the feed differences.

Grain in Bin

Using a grain probe to obtain the sample is highly desirable. However, if one is not available, you can randomly grab samples from 10 to 15 areas of the bin, mix them and send a representative sample (1 quart) for analysis.

General

Getting a representative sample is as important as procedural and technical expertise. When sampling, consider the intended use of the results and the time and cost involved.

When forage analysis reveals a quality too low to meet your herd or flock needs, you may want to re-examine the cropping practices (fertilizer used, variety selection of forage, harvest time and method of harvest, etc.) and provide supplements to meet livestock production demands. Those who find their feed supply to be above average can save money by reducing their supplements. Even when an analysis reveals average-quality feed supplies, this information serves as a basis for sound crop and livestock decisions that will help maximize economic farm returns.

When forage quality is low, testing is the most important investment you can make. This is a good time to consider a "wet chemistry" lab analysis. When producers have no choice but to utilize inferior quality feeds, experience shows that discounting the expected nutrient value is prudent. Even though you're trying to save on feed inputs, poor-quality feeds generally don't elicit the animal performance expected. NIRS (near infrared spectrophotometry), although quick and inexpensive, should not be relied upon in these cases unless duplicate samples of some of the feeds/forages have been double-checked with those results of a reliable lab using more extensive analysis.

Who Will Test Your Samples?

Forage and grain testing for nutrient content can be performed via NIRS or through wet chemistry. Wet chemistry can be used for any forage type or mixture of forages, grains and other plant species. While testing individual diet components is preferable, wet chemistry is the method of choice when considering mixed feeds.

NIRS is used only for "pure" samples due to set calibrations for specific plant species or grain type. Examples of "pure" samples are 100 percent barley or 100 percent alfalfa without grasses or weedy species. NIRS is a less expensive method of analysis that provides similar results to wet chemistry when the sample is pure. Some local elevators and feed companies will use NIRS to test forages, and most elevators test grain samples through NIRS.

> Wet chemistry is only conducted by laboratories capable of performing tests on feedstuffs. The National Forage Testing Association (2012) lists laboratories capable of conducting NIRS and wet chemistry analysis.
>
> The list is available at:
> www.foragetesting.org/files/2012/2012_Certified_Labs.pdf.

Toxicology Verses Nutrient Analysis

The techniques described in this publication apply to samples taken for nutrient content or toxicological tests. Refer to the lab request form to determine the analytical services offered.

Feed Sampling Checklist (✔)

This page is provided as a sampling reminder and feed analysis record. **DO NOT** use it to substitute for the appropriate lab analysis request forms supplied by the testing laboratory. Use this reference to track your samples and as a worksheet for transferring the collected information to the laboratory request sheet.

Laboratory Information – Refer to the lab of choice for charges. (Costs will vary with lab, type of tests and combination of tests requested.)

Name of Lab_____ Address _____

City_____ State_____ ZIP _____

Phone ( )_____ Fax ( )_____

Type of feed (example – 50 percent alfalfa: 50 percent brome) _____

Analysis requested (check those requested)

_____ **WET CHEMISTRY**
- ❑ moisture (dry matter)
- ❑ fat
- ❑ pH
- ❑ crude protein
- ❑ soluble protein
- ❑ degradable protein
- ❑ crude fiber
- ❑ ADF (acid detergent fiber)
- ❑ NDF (neutral detergent fiber)
- ❑ ash

Minerals
- ❑ aluminum (Al)
- ❑ calcium (Ca)
- ❑ cobalt (Co)
- ❑ copper (Cu)
- ❑ iron (Fe)
- ❑ magnesium (Mg)
- ❑ manganese (Mn)
- ❑ molybdenum (Md)
- ❑ phosphorus (P)
- ❑ potassium (K)
- ❑ selenium (Se)
- ❑ sodium (Na)
- ❑ sulfur (S)
- ❑ zinc (Z)

_____ **NIRS (Near Infrared Spectrophotometry)**
- ❑ moisture
- ❑ protein (dry matter)
- ❑ available crude protein
- ❑ ADF (acid detergent fiber)
- ❑ NDF (neutral detergent fiber)
- ❑ calcium (Ca)
- ❑ magnesium (Mg)
- ❑ phosphorus (P)
- ❑ potassium (K)

Calculations requested (from either wet lab or NIRS above) ❑ NEL (net energy for lactation) ❑ RFV (relative feed value)

Others (not included above, example — vitamins, toxicology) _____

Background information – You are encouraged to record the following information for your reference. The lab may not require it, but often times additional information can be useful to evaluate your request.

Acres being samples (example – 50 acres field peas and oats) _____

Livestock to be fed (example – yearling Holstein heifers, dry cows) _____

Description of feed_____

Date harvested _____/_____/_____ Date sampled _____/_____/_____ Date sent _____/_____/_____

Weather conditions at harvest_____

How will this feed be used? _____

(Make extra copies for future use)

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