

Hay Sampling Strategies for Getting a Good Sample

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Knowing the nutritional quality of forage and hay is an integral part of a profitable and efficient livestock operation. Accurate estimation of forage quality starts with obtaining a representative sample of the forage to be fed. Proper sampling technique is critical. Hay is preserved in different packages, ranging from the small square bale weighing 40 to 50 pounds to the large square bale weighing more than 1,500 pounds. In Kentucky, most hay is packaged in large round bales weighing between 500 and 1,500 pounds. Wrapped bale silage is also gaining popularity and should be sampled in a similar manner to large round hay bales with the exceptions listed below.

Selecting a Hay Probe

A representative sample starts with cores taken with a properly designed hay probe. Probes can be either manually operated or power driven. If sampling is done frequently, it may be advisable to consider a probe that can be used with an electric or gas-powered hand drill (Figure 1). *Collecting grab samples or bale slices does NOT provide a representative sample.*

Consider the following criteria when selecting a probe:

- **Internal diameter of probe.** Bale probes should have an internal diameter of

Key Points

- Always collect hay samples by coring hay bales with a sampling probe designed for hay.
- Always sample hay in lots. A lot consists of a harvest-field combination.
- Delay sampling for dry hay stored inside for three to four weeks after harvest.
- Delay sampling for hay stored outside until three to four weeks prior to feeding.
- Collect 20 cores per hay lot.
- Use a sampling strategy to obtain a representative sample of the hay lot. For example, if a hay lot has 200

bales, core every 200 bales ÷ 20 cores or every 10th bale.

- Core square bales from the end.
- Core round bales from the side.
- Do NOT subdivide samples.
- Place entire sample into labeled plastic bag and ship to lab.
- Delay sampling baleage for four to six weeks after baling to allow fermentation to finish.
- Refrigerate baleage samples prior to shipping.
- Repair holes in silage film with UV stabilized tape designed for silage wrap.

at least $\frac{3}{8}$ inch. A narrower diameter may move between flakes or layers of hay and may not provide an adequate representation of the leaf-to-stem ratio of the forage.

- **Probe length.** The probe should be able to penetrate the bale at least 14 inches, and ideally 15 to 18 inches. A shorter length may not provide an accurate representation of the bale.
- **Ability to maintain sharp cutting edge.** The probe should be equipped with either a replaceable tip or a fixed tip that can be

sharpened. A dull cutting edge can alter sample composition by pushing stems aside rather than cutting them, and may cause excessive heating in the forage sample, which can alter test results.

- **Ability to collect entire core.** No part of the core should be lost as the probe is withdrawn from the bale or the sample is unloaded from probe.
- **Presence of a canister to collect cores.** Some probes incorporate an in-line canister as part of their design (Figure 2), which allows multiple cores of a hay



Figure 1. Hay probes are available that attach to a power drill instead of having to be drilled by hand. These designs are much more conducive to large samples than hand-powered options.



Figure 2. Some hay probes have a canister at the end of the probe to collect multiple samples.



Figure 3. To avoid clogging the probe, use a plunger to clear the probe into the canister after each sample has been taken.



Figure 4. Some hay probes only hold one sample at a time and must be plunged into a bag or bucket between every sample.

lot to be accumulated quickly. This design often speeds the collection of samples because the probe is only emptied after the required number of samples is pulled. A plunger should be used to clear the probe after each core is taken (Figures 3 and 4).

An up to date list of hay probes can be found on the [UK Forages webpage](#).

Obtaining a Representative Sample

Hay should *always* be sampled in lots (Figure 5). A lot consists of hay made from the same field and cutting. A lot should not represent more than 200 tons of dry matter. In the event that a lot exceeds 200 tons of dry matter, multiple samples should be taken and forage quality results should be averaged to represent the over-all lot.

Delay sampling until three to four weeks after baling for hay stored out of

the weather. During this period bales undergo the heating or sweating process and forage quality can decline. For hay stored outside, it is best to delay sampling until three to four weeks *prior to feeding* to account for weathering that occurs after harvest. Remember to allow time for sample shipping and analysis and for making the feeding adjustments needed.

A representative sample will consist of 20 cores from 20 bales (one core per bale), resulting in a sample size of approximately one-half pound of hay from each lot. Sample bales at random or using a sample strategy and not on some predetermined characteristic such as leafiness, color, or weed content.

Using a sampling strategy such as dividing the total number of bales by the number of desired cores can help to get a representative sample of the hay lot. For example, if a lot consists of 240 large

round bales and 20 cores are desired, then every 12th bale should be sampled ($240 \text{ total bales} \div 20 \text{ cores} = \text{every 12th bale}$). If the lot contains less than 20 bales, sample every bale. For stacked hay or truckloads, count the number of exposed bale ends (square bales) or sides (round bales), divide by 20, then sample every *n*th bale exposed on the end or side. Using the above numbers, if there are 240 bale ends on an exposed side, sample every 12th bale. Equally sample each exposed side of the stack.

Core rectangular bales by centering the probe in the end and inserting the probe horizontally into the bale (Figure 6). Sample round bales by drilling or pushing the probe horizontally into center of the rounded side of the bale (Figure 7).

For round bales, prior to sampling remove weathered material from the area to be probed. Weathered material represents



Figure 5. Always sample hay in lots. A lot is hay that comes from the same cutting and the same field.



Figure 6. Large and small square bales should be sampled from the ends to a depth of 15 to 18 inches.



Figure 7. Round bales should be cored from the side to a depth of 15 to 18 inches.



Figure 8. Always submit the entire sample. Subdividing the sample can result in altered lab results since the fine material segregates from the larger particles. Clearly label the bag with all required information.

refusal and should not be included in the sample. The probe should penetrate the bale at least 15 to 18 inches for rectangular or round bales.

After the lot has been sampled, the entire sample should be placed into a labeled plastic bag and sealed (Figure 8). Make sure that the bag is clearly labeled with your farm's name, a description of the hay lot sampled that will allow you to reference the results back to the hay lot, the type of hay, cutting, year, and the date it was sampled. The sample should be sent immediately to the lab for analysis. In cases where the sample is not immediately submitted, store the sample in a cool, dry place that is not in direct sunlight. Complete the sample submission form for the lab that you are using. *Do NOT subdivide the sample.*

Sampling Baled Silage

Sample baled silage in the same manner as hay. Delay sampling until at least four to six weeks after harvest to allow the fermentation process to finish. Samples should be placed into labeled plastic bags as previously described and any air should be pressed out before sealing. Submit the samples immediately or refrigerate until shipped. Remember to immediately repair holes in plastic wrap caused by coring using a UV-resistant tape designed for silage film.

Subdividing Excessively Large Samples

Using a larger diameter or longer probe or collecting more than 20 cores result in a sample greater than a half pound. This is not a problem in itself and may even be more representative of the hay lot; however, most labs are not set up to handle and grind large sample sizes and will only grind a portion of the sample. The portion of the sample ground may not be representative of the lot, so *avoid submitting excessively large samples for analysis.*

If a sample must be subdivided, it should be done using a technique called "quartering" (Figure 9). Thoroughly mix the sample, then pour it onto a clean and flat sheet of butcher paper or similar material. Divide the sample into four equal parts, and discard two opposite quarters. Recombine the two remaining quarters. If the sample size is still too large, repeat the procedure until the desired sample size is obtained.

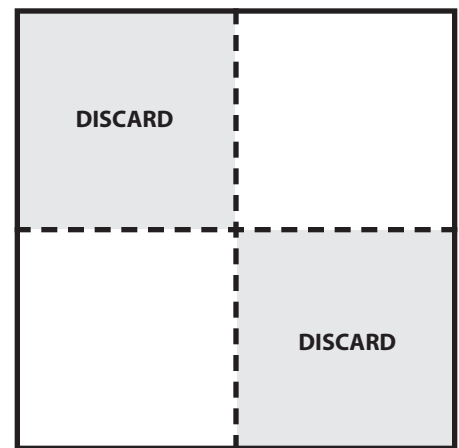


Figure 9. If excessively large samples must be subdivided, use the quartering technique. Quartering a sample is accomplished by thoroughly mixing the collected cores, pouring the sample onto a clean flat surface, discarding opposite quarters, and recombining the remaining quarters. This technique is repeated until the desired sample size is obtained.