FORAGE SAMPLING PROTOCALS AND HAY SAMPLING DEVICE FEATURES

Jody A. Gale, J. Earl Creech, Glenn E. Shewmaker, and Daniel H. Putnam[1]

ABSTRACT

Testing forage is important to determine nutrient levels of forage grown for livestock feed. Test results provide analytical information needed to characterize forage quality, establish price, and balance high performance, least cost livestock feed rations. It is critical that a composite sample is representative of the harvested forage. The small size of a sample must be considered relative to the many tons of forage it represents. Analytical laboratories prepare samples by grinding and use a very small amount for the analysis. Composite forage samples should be taken using established, research based, protocols recommended by the National Forage Testing Association (NFTA) (https://www.foragetesting.org/. It is important is to use a sharp, well designed, sampling device for dry forages or established methods for sampling high moisture forages. When recommendations are followed, a composite sample will accurately represent the forage being analyzed. The first step of the sampling process is to identify the "lot" of forage. In simple terms, a "lot" is defined as harvested forage that has had similar treatment. It should be from the same cutting, same maturity, same field, same variety, and same day of harvest. The purpose of taking many cores from many bales, in a lot will average out small extremes and compensates for normal, reasonably variation in forage quality in a field. Field conditions and production factors that cause large extremes and variations in quality in large amounts of the forage should identified and mitigated. They may include large portions of the field with different soil types, inconsistent irrigation, large dense patches of weeds, and excessive humidity changes during baling. Variation in quality in a lot can be reduce by separating and storing large amounts of forage from a field that has not had similar treatment as it is being hauled and stored. The concept of forage sampling is not unlike soil sampling. Taking a shovel full or one core of soil from a couple places in a large field will not accurately represent the soil. Collecting loose, flake type grab samples from dry windrows or baled hay, will not accurately represent a lot of hay. As grab samples are taken by hand from dry forage, leaves and other small and higher quality parts of the plant separate out and are lost. The sample is then biased, and the report will show lower quality than the actual quality of the forage. NFTA protocol recommends that a hay sampling device be used to sample dry, baled hay by horizontally taking a single core from the middle of the butt end of a bale. At least 20 cores (one per bale) should be taken from a lot of dry hay on up to 200 tons. During the sampling process, the 20 individual cores or subsamples are combined together in the sampler collection cannister, a bucket or plastic bag and mixed together to form the "composite" sample. NFTA recommends using hay sampling devices with a 12"-24" long probe with at least a 3/8"-3/4" diameter sharp cutting tip (Undersander, et. al.,

[1] J. A. Gale (jody.gale@usu.edu) Associate Extension Professor-Sevier County Agricultural Agent-Southern Area Economic Development, Utah State University Extension, 250 N. Main, Sevier County Adm. Bldg., Richfield, UT 84701. J. E. Creech (earl.creech@usu.edu) Associate Professor-Extension Agronomist, Plant Soils and Climate Department, Utah State University, 4820 Old Main Hill, Logan, UT 84322-4820. G. E. Shewmaker (gshew@uidaho.edu) Professor, Extension Forage Specialist, University of Idaho Extension, Kimberly Research and Extension Center, 3793 N 3600 E, Kimberly, ID 83341-5082. D. H. Putnam (dhputnam@ucdavis.edu) Professor, Alfalfa and Forage Extension Specialist, University of California at Davis, One Shields Avenue, Davis, CA 95616. **In:** Proceedings, 2019 Western Alfalfa and Forage Symposium, Reno, NV, 19-21 November, 2019. UC Cooperative Extension, Plant Science Department, University of California, Davis, CA 95616. (See http://alfalfa.ucdavis.edu for this and other Alfalfa symposium proceedings.).

1993). Large diameter tips and long probes take very large samples that needlessly require extensive grinding time at the laboratory. Sampling high moisture or wet forage can be done by carefully taking many grab subsamples making a composite sample from a horizontal bunker, silo, or bag. The sampling principles are essentially the same by identifying a lot of forage that has had similar treatment and taking many subsamples. During harvest, take subsamples from various loads of forage to determine dry matter content needed to calculate yield. When testing for forage quality, wait for at least two weeks until the ensiling fermentation process has completed. Samples should be taken and analyzed regularly as silage is removed from a horizontal bunker, large plastic ag bags or silo unloader. Spoiled silage from the top of a bunkers should not be sampled. Silage sampled after disturbance by a frontend loader from the various layers of the face should be immediately collected after exposure to the air. Larger diameter sampling devices designed for silage may also work. Contact your lab for sample handling procedures and shipping instructions to assure samples is handled correctly. High moisture forage composite samples should be immediately cooled and put in plastic bags as they are collected. They should be immediately refrigerated or frozen. Samples should be shipped in insulated packing material early in the week or overnight to assure they are not stalled in transit over a weekend. Wet and dry forage samples should be kept out of the sunlight, stored, properly packaged, and shipped, to prevent degradation before analysis. Decisions based on test results from biased, non-representative or degraded forage sample cause unpredicted livestock performance and damage reputations of growers, forage brokers, and nutritionist. When research based NFTA forage sampling protocols are followed and well-designed sampling devices and methods are used, those in the forage supply chain can be confident that test results accurately represent the forage. Similar or repeatable test results on a lot of hay can be obtained by following the same sampling protocols, using the same sampling devices and methods, and by using accredited laboratories. Experience and research by Extension faculty and specialists at Utah State University Extension, University of Idaho Extension, and University of California Extension at Davis have identified several important design features of hay sampling devices. The study compared 18 commercially available, widely used, or readily available hay samplers. The lot of hay sampled consisted of 70 one-ton bales of third crop alfalfa hay. Each sampler was used to take the recommended 20 cores for the composite sample. This was done by coring horizontally into the butt end of the bale and at the same relative position near the center. Each core was analyzed by an accredited Near-Infrared Spectroscopy (NIRS) university laboratory and results were averaged for a composite analysis. Each sampler with its respective design features were evaluated for accuracy and usability. Important features included, probe length, cutting tip diameter, smaller inside tip diameter than probe tube, cutting edge, tip slope, tip bulb out effect, and collection chamber. A separate study of core position in the butt end of a bale was also completed. Variation in forage quality decreases from the top of the bale to the bottom supporting the recommendation for sampling in the middle of the bale.

KEY Words: Forage sampling, hay probe, hay sampler, hay sampling device, sampler

REFFERENCES

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