

NATIONAL FORAGE TESTING ASSOCIATION 2010 CERTIFICATION PROGRAM REQUIREMENTS

January 2010

The mission of the NFTA is to improve the accuracy and reproducibility of laboratory analyses that are important for the evaluation of nutritive value in forages. Accuracy can only be determined by comparing results to a reference value that can be defined unambiguously. To promote accuracy, the NFTA has defined reference methods that can be used to obtain the reference method average (RMA) to which all laboratories are compared. Collaborative studies that were designed to measure the reproducibility of standard analytical methods can be used to define the acceptable variation in results among forage testing laboratories. The NFTA uses a proficiency testing (or check sample) program to provide an unbiased assessment of the accuracy and reproducibility among participating laboratories. To provide valid comparisons for themselves and their clients, laboratories are honor bound to report results to NFTA that are representative of methods that they use routinely.

Certification during 2010 will be based on the final cumulative BIAS TOTAL ACCURACY for DM, CP, ADF and NDF for eight materials. Bias will be measured as the difference between each laboratory's result and a reference method average (RMA) for each analysis. The RMA will be determined as the censored average value for all labs using the reference method. The range in bias accepted for each grade will be based on a standard deviation that is calculated from the RMA using the equation of Horwitz (or a modified Horwitz approach for DM).

2010 Certification Standards

1. Certification will be based on the analysis of dry, ground samples of alfalfa (five total, one of which will contain at least 20 percent grass), corn silage (two), and grass (one) for DM, CP, ADF and NDF. **Participating laboratories are required to submit results using their routine method without bias adjustment unless they routinely adjust all results.** Certification samples should be handled and analyzed exactly like any material received from a client. **All results must be reported on an AS-IS or AS-RECEIVED basis.**
2. To be designated as Certified, labs will be required to receive a grade of "C" or higher on cumulative BIAS TOTAL ACCURACY for all analyses (DM, CP, ADF, NDF) averaged across all eight samples during 2010.

The NFTA strongly encourages labs to make changes in methodology and technique to prepare them for being certified as proficient in 2010.

3. To be designated as certified as proficient, laboratories also must submit their responses to the 2010 Methodology Questionnaire and **sign the Statement of Ethics** indicating that their results for NFTA samples were generated using the same methods that are routinely used in their laboratory.

4. DO NOT DO TRIPLICATE ANALYSES IN SUCCESSION WITHIN A SINGLE RUN. To correctly measure repeatability within a lab, replicated analyses should be weighed and determined in separate runs, preferably on different days. For NIRS analyses, three separate holders should be packed and scanned, preferably on different days and times of the day.
5. The bias of each reported result will be calculated as the difference from the Reference Method Average (RMA) for that analyte and sample. The RMA will be determined from the results of all labs that used the reference method for analysis as indicated by their responses to the 2010 Methodology Questionnaire. To ensure that results of outlying labs are not used to calculate the RMA, a censored (robust) average will be determined. Reference methods for each analysis are given in the *NFTA Forage Analyses Procedures Manual*.
6. The acceptable range in bias is based on the Horwitz expected standard deviation among labs. Horwitz (1982) analyzed the results of AOAC collaborative studies and observed that the among-lab coefficient of variation (standard deviation divided by the mean) was related to the mean concentration (e.g., RMA) of the analyte over a wide range of methods. Because it was developed using data across methods that became more precise as the mean analyte concentration approached ppm or less, the Horwitz equation may be biased when applied to a single type of method when analyte concentrations approach 0%. Variation in gravimetric methods, which are based on weighing residues (such as DM, ADF and NDF), would not be expected to approach zero as the concentration of the analyte approached zero because variations due to sampling and weighing would not disappear. This is not a problem for ADF and NDF because fiber values are typically greater than 20%, but it is a problem for moisture. In the past NFTA had overcome this deficiency in using the HSD to evaluate proficiency for DM analysis by doubling the variation allowed for each grade. However, the new DM reference method (105 °C for 3 h) results in lower moisture values and this approach was no longer tenable. Data from the RMA labs for the past three years were used to develop a modified HSD (mHSD) equation ($mHSD = .381 + .0159 \cdot RMA$), which was adopted by the NFTA Board on February 19, 2003 for certifying proficiency for DM. The relationships between the RMA and HSD or mHSD are shown in the following table:

RMA	HSD	mHSD
10	± 0.28	± 0.54
20	± 0.51	± 0.70
30	± 0.72	± 0.86
40	± 0.92	± 1.02
50	± 1.11	± 1.18
60	± 1.30	± 1.34

7. Grades will be provided for each analyte and sample, but only the grade for the final cumulative BIAS TOTAL ACCURACY will be used to assess certification status. The acceptable range for DM analysis will be based on the moisture removed rather than the DM recovered. The acceptable range in the bias for each grade are indicated in the following table (individual samples will use individual HSD and cumulative bias will use cumulative HSD):

Grade	Acceptable Range for CP, ADF, NDF	Acceptable Range for DM/Moisture
A	<1.00*HSD	<1.00*mHSD
B	1.01 to 2.00*HSD	1.01 to 2.00*mHSD
C	2.01 to 3.00*HSD	2.01 to 3.00*mHSD
F	>3.01*HSD	>3.01*mHSD

8. Cumulative Laboratory Bias Variation measures a lab's variation in bias from the RMA for a particular method. It provides an indicator of the average bias (BIAS AVERAGE) and the variation (precision) in that bias (BIAS PRECISION) across all the samples that have been analyzed during the year. Cumulative BIAS TOTAL ACCURACY will be used to determine certification because it combines the variation in the average bias and its precision across all samples. Cumulative statistics are also provided for Laboratory Total Variation, which measures the total variation within sample replication and between the laboratory and the RMA. If laboratories do not selectively submit data (by doing more than three analyses and submitting the closest three), this set of cumulative statistics is the best indication of the total accuracy of the results from a lab, because it measures within-lab precision (repeatability), the among-lab bias (reproducibility = sum of variation associated with precision and bias).
9. There will be no retests in 2010 for any analyses that do not meet acceptable standards.
10. Results must be received at the NFTA office NO LATER THAN the date indicated for the sample (usually within 28 days). Results not submitted within this time will be penalized by assigning them a BIAS TOTAL ACCURACY of 5.5*HSD for that sample.
11. Inaccurately calculated or reported results will be entered as submitted. Laboratories wishing to make a request for review and/or change of check sample results must make their request in writing to the NFTA Arbitration Committee.
12. Laboratories not involved in commercial testing may petition to exclude corn silage from their certification requirements. The laboratory must document, in writing, that it is not involved in commercial testing and that it does not analyze corn silage. The petition will be considered by the Arbitration Committee. If accepted, the laboratory will not be penalized for not reporting results for corn silage and a limited certification for hay only will be issued, providing the laboratory passes requirements on the remaining six samples.

13. All laboratories will have the option of reporting calcium (Ca), phosphorus (P), magnesium (Mg), potassium (K), copper (Cu), Zinc (Zn), sulfuric acid lignin and acid detergent insoluble nitrogen (ADIN). These values are provided for laboratory information only and do not affect certification.
14. NIRS labs are asked to submit the H statistic for each of the three replicate scans of the sample (these scans be must three separate subsamplings and packings in three different holders). This data is used for information purposes only and does not affect certification.

New laboratories or failing laboratories that improve their grades on samples late in the year may now petition to have their grade recalculated early in the next year using the most recent set of six consecutive samples. For example, the last three grades from a failing year could be considered together with the first three grades from the following year for reconsideration. If recalculation results in a passing grade, the laboratory would then receive certification for the current year.