

CALIFORNIA HAY TESTING CONSORTIUM

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INTERPRETING YOUR HAY TEST REPORT

By

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Your laboratory is participating in the CALIFORNIA HAY TESTING CONSORTIUM, which is a University of California-sponsored effort to increase the consistency and quality of the hay testing process in California. There may be a few minor changes in your hay test report this year, as labs throughout the state adjust methods to provide greater consistency in lab tests. Labs participating in the California Hay Testing Consortium practice methodologies recommended by the Association of Official Analytical Chemists or National Forage Testing Association for ADF, NDF, CP, and DM. Both wet chemistry and Near Infrared Spectroscopy (NIRS) methods are currently approved by both associations. The following information is provided to aid in the interpretation of your hay test results.

IMPORTANCE OF SAMPLING

The analytical results you receive are meaningless if the hay sample you submitted did not fairly represent a hay lot. Remember that the greatest source of inconsistency in hay test values is usually due to poor sampling procedures. A *minimum* of 20 randomly-selected cores per lot is recommended (sample every 4th or 5th bale as you walk around the stack). A 'lot' consists of hay of one variety from one cutting from the same field. A small bore (3/8" to 5/8") sampler with a 90° sharp end should be used. The combined sample should be temporarily stored and shipped under cool conditions in plastic zip-lock bags.

WHAT DO THESE VALUES MEAN?

Your hay test report contains a number of measured and calculated values. Interpretation of these values is often confusing, but the brief definitions provided below should help.

Measured values

DM - Dry Matter. (100 - %moisture). This value is used for calculating nutrient content on a 100% DM basis and is important for determining the amount of water which is being purchased in a hay lot. All the following nutrient values should be expressed on a

100% DM basis.

ADF - Acid Detergent Fiber. This is a measurement of the percent lignin and cellulose contained in plant material. Since these components are poorly digestible, ADF is negatively related to *digestibility* in forages. It can be measured by wet chemistry or NIRS.

NDF - Neutral Detergent Fiber. This value estimates the percent lignin, cellulose, and hemicellulose in plant material. NDF is negatively related to *forage intake*, which is important in predicting animal performance. It can be measured by wet chemistry or NIRS.

CP - Crude Protein. This is a measurement of the protein percentage of the plant material, based upon the concentration of nitrogen. The Kjeldahl method, combustion, or NIRS can be used to estimate CP.

Calculated Values

After laboratory measurements are made, several values are calculated which may be of use to dairy farmers or nutritionists. Although there are a number of equations available to calculate these values, participants in the CA Hay Testing Consortium have

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TDN - Total Digestible Nutrients. This value estimates the total amount of digestible energy in a forage. Participating labs calculate TDN on a 100% DM basis from ADF using the California equation: $TDN (\% \text{ of DM}) = 82.38 - (0.7515 \times ADF\%)$.

NEL - Net Energy of Lactation. This value estimates the total amount of energy available for lactation, taking into account the losses of energy in feces, urine, gases, and body heat. It is calculated using the following equation: $NEL (\text{Mcal/kg DM}) = 1.8983 - (0.0184 \times ADF\%)$.

DDM - Digestible Dry Matter. A National Equation has been developed for comparing alfalfa from different areas [$DDM\% = 88.9 - (0.779 \times ADF\%)$]. However, TDN and NEL are probably more accurate for predicting the energy value of western-grown alfalfa hay.

REPORTING

Most values in your report will probably be reported on an "As Received", "90% DM basis" and "100% DM basis". Keep in mind that all analytical values (ADF, CP, etc.) are determined on a 100% DM basis from which all other values are calculated. For most comparisons, the **100% DM basis** values are the most useful and should be highlighted on your sheet. However, many growers and buyers are accustomed to looking at the "90% DM" values for comparing hay lots. The "As Received" numbers are useful for determining how much water is being purchased in a load. Be careful to compare hay lots using values based upon the same %DM.

INTERPRETATION

When comparing hay lots, we recommend using the ADF values at 100% DM, since all estimated energy values are calculated using ADF. Nutritionists use %ADF to formulate rations, so it is a good idea to become familiar with the normal range of these values. We also recommend examining %NDF values at 100% DM since NDF is related to voluntary intake. Keep in mind that each value is not absolute, but should have an associated "error range" which represents the experimental error of that number. Normal lab variation (not including sampling error) is considered to be: CP (± 0.5), ADF (± 0.7), NDF (± 0.9), and TDN (± 0.7) percentage points. For example, a sample which has an average value of 20% CP will give lab results ranging from 19.5 to 20.5% CP. Remember, also, that visual inspection is important to determine presence of molds, noxious weeds or other defects which are not evaluated by a lab test.

FOR FURTHER INFORMATION

Bath, D.L. and V. L. Marble, 1989. Testing Alfalfa for its Feeding Value. Coop. Extension Leaflet 21457. University of California Division of Agriculture and Natural Resources.

Undersander, D., D. R. Mertens, and Nancy Thiex. 1993. Forage Analyses Procedures. National Forage Testing Association. PO Box 371115, Omaha, NB 68137. (402-333-7485).

Putnam, D.H. 1994. Alfalfa Hay Testing: What do the results really mean? In 24th California Alfalfa Symposium Proceedings. Department of Agronomy and Range Science, University of California, Davis 95616.

WHAT'S IN A FORAGE PLANT?

Forage plants are made up of billions of cells. Some cellular constituents are more digestible than others. Cell soluble contents are essentially completely digestible. The cell wall is the most difficultly digested portion of the plant, and therefore is a good predictor of forage quality. The ADF fraction predicts digestibility, and NDF predicts intake.

