

Agri *Resource*

FEED & FORAGE INTERPRETATION

For more information, visit our Feed & Forage terminology page at:
<http://www.agrianalysis.com/feed-and-forage-terminology.shtml>

Moisture & Dry Matter (DM)

Moisture % indicates the proportion of water in the sample, calculated by weighing the sample before and after complete drying. For example, if a sample of silage weighs 100 grams before drying and 40 grams after drying, it is assumed that 60 grams of water were lost. The original sample, therefore, consisted of 60% moisture and 40% dry matter.

We report our lab results in both a wet and dry basis. The wet basis is referred to as "As Received" whereas the dry basis is referred to as Dry Matter (DM). Again, dry matter is the percentage of forage that is not water ($DM\% = 100 - \% \text{ moisture}$).

Knowing DM content is important for:

1. *Ration formulation.* Nutrient requirements of animals are expressed on a DM basis. Animal intake is regulated more by DM intake than volume of feed consumed.
2. *Comparison of forages.* Nutrients are contained in the DM portion of forages.
3. *Predictor of indicator of storage problems.* Forages ensiled when too dry, or hay baled when too wet, can heat, reducing protein availability and/or becoming moldy. Ensiling forages too high in moisture can result in excessive losses through seepage and undesirable fermentation.

Crude Protein (CP)

Crude protein is both true protein and nonprotein nitrogen. It is determined by measuring total nitrogen and multiplying this number by 6.25. Crude protein content indicates the capacity of the feed to meet an animal's protein needs. Forages which are moderate to high in CP (14 to 20%) reduce the need for supplemental purchased protein. Crude protein levels will be affected by the timing of forage harvest. As forage plants mature, the CP level in the plant declines. However, total CP per acre may increase as forage quantity increases with maturity. With timing and management, forage quality and quantity can be optimized to meet the specific nutrient needs of your herd.

Acid Detergent Fiber (ADF)

Acid detergent fiber (ADF) is the percentage of highly indigestible and slowly digestible material in a feed or forage. This fraction includes cellulose, lignin and pectin. Lower ADF indicates a more digestible forage and is more desirable. Since the digestibility of a feed determines its energy value, the primary use of ADF % is in the calculation of the energy values reported:

Net Energy (NE)

Net energy is a more comprehensive measure of energy than TDN. Three measures of NE are used: NE_l(lactation), NE_m (maintenance), and NE_g (gain). All are expressed as megacalories (Mcal) per 100 pounds of feed DM. The NE_m and NE_g are used primarily in formulation of beef rations, whereas NE_l is used in formulation of dairy cow rations. Feed energy is used equally well for maintenance and milk production but less efficiently for body weight gain.

Neutral Detergent Fiber (NDF)

Neutral Detergent Fiber (NDF %) is the percentage of cell walls or fiber in a feed. (NDF % is a more complete measure of forage fiber than ADF % and therefore, its value must always be higher. The difference between ADF % and NDF % is normally greater for grasses and cereal silages than it is for legumes, such as alfalfa. The NDF value is inversely related to animal intake potential – lower NDF percentages indicate greater animal consumption. Thus, a low percentage is desirable as long as a certain minimum fiber level in the ration is met.

Neutral Detergent Fiber Digestibility (NDFd): NDFd is a measure of the digestibility of neutral detergent fiber. This approach enables nutritionists to formulate better rations. More accurate energy predictions can be made and dry matter intake achieved. Both wet In vitro and NIRS tests are available.

Minerals

All forages should be tested for calcium and phosphorus. Many standard forage test options also include other minerals based on common mineral deficiencies in a specific locality. Minerals identified in the forage sample will reduce the need for some costly purchased mineral supplements.

Relative Feed Value (RFV)

Relative feed value is an index that combines important nutritional factors (potential intake and digestibility) into a single number for a quick, easy and effective method of evaluating feeding value or quality in certain forages. RFV has no units, but the index allows for comparisons of legume, grass and legume/grass forages. A relative feed value is not to be used for nutritional ration balancing. Instead, it will assist in determining the value of a material for marketing purposes. The higher the RFV in all forages, the more digestible and palatable they are (Table 1). While crude protein is not included in the RFV equation because it is not highly correlated with digestibility or intake, the more mature the plant, the lower the percent of protein.

Table 1: Forage Quality Standards for legumes, grasses, and legume-grass mixtures¹

Quality Standard ¹	Relative Feed Value	ADF	NDF	Crude Protein
Prime	> 151	< 31	< 40	> 19
Premium	151 -125	31 – 35	40 - 46	17 – 19
Good	123 – 103	36 – 40	47 – 53	14 – 16
Fair	102 – 87	41 – 42	54 – 60	11 -13
Poor	86 – 75	43 – 45	61 – 65	8 – 10
Reject	< 75	> 45	>65	≤ 8

¹ Standard Assigned by Hay Marketing Task Force of the American Forage and Grassland Council

Table 1: Forage quality ranges for samples analyzed at Agri Analysis, Inc.
All analytes reported on a dry matter basis, as % Dry Matter.

	Dry Matter	CP	ADF	NDF	Fat	Ash	Starch	Sugar	P	Ca	K	Mg
Corn Silage	27.0 - 41.0	7.0 - 10.0	20.0 - 30.0	39.0 - 52.0	2.2 - 3.5	2.5 - 5.5	18.4 - 38.7	1.1 - 1.9	0.18 - 0.30	0.18 - 0.45	0.88 - 1.40	0.13 - 0.22
Legume Silage	29.0 - 61.0	16.0 - 24.0	31.0 - 42.0	40.0 - 55.0	2.0 - 5.0	5.0 - 15.0	0.49 - 1.60	2.25 - 8.56	0.24 - 0.42	0.95 - 1.64	2.20 - 3.62	0.18 - 0.34
Mixed Silage	26.0 - 61.0	12.0 - 20.0	32.0 - 42.0	47.0 - 59.0	2.0 - 5.0	5.0 - 15.0	0.45 - 1.71	1.7 - 9.1	0.18 - 0.38	0.70 - 1.25	1.75 - 3.05	0.10 - 0.30
Grass Silage	26.0 - 54.0	8.0 - 15.0	35.0 - 45.0	50.0 - 70.0	2.0 - 5.0	5.0 - 15.0	0.54 - 1.15	2.3 - 7.8	0.18 - 0.42	0.38 - 0.93	1.25 - 2.86	0.13 - 0.28
Legume Hay	78.0 - 88.0	16.0 - 21.0	32.0 - 41.0	41.0 - 53.0	1.5 - 4.5	5.0 - 15.0	1.4 - 2.6	2.3 - 7.8	0.23 - 0.39	0.90 - 1.42	1.90 - 3.25	0.15 - 0.32
Mixed Hay	78.0 - 88.0	11.0 - 19.0	34.0 - 42.0	47.0 - 59.0	1.5 - 4.5	5.0 - 15.0	1.4 - 2.9	3.6 - 11.3	0.18 - 0.38	0.65 - 1.10	1.40 - 2.60	0.10 - 0.28
Grass Hay	78.0 - 91.0	7.0 - 14.0	34.0 - 45.0	48.0 - 70.0	1.5 - 4.5	5.0 - 15.0	0.79 - 3.7	5.3 - 14.0	0.17 - 0.45	0.38 - 0.80	1.10 - 2.77	0.09 - 0.25
Small Grain Silage	22.0 - 54.0	11.0 - 21.0	30.0 - 41.0	47.0 - 66.0	2.0 - 5.0	5.0 - 10.0	0.42 - 1.02	0.05 - 16.9	0.30 - 0.49	0.25 - 0.74	2.30 - 4.10	0.13 - 0.26
Shelled Corn	68.0 - 83.0	8.0 - 11.0	2.4 - 5.3	7.2 - 14.5	2.5 - 4.0	1.0 - 2.0	64.8 - 72.1	0.88 - 1.72	0.25 - 0.42	0.02 - 0.09	0.35 - 0.53	0.10 - 0.15
Ear Corn	65.0 - 81.0	8.0 - 11.0	7.0 - 11.0	25.0 - 30.0	2.5 - 4.0	1.0 - 2.0	56.4 - 67.3	1.1 - 1.8	0.25 - 0.42	0.02 - 0.08	0.35 - 0.53	0.10 - 0.15