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Understanding and Interpreting Feed Analysis Reports

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The feed analysis report may include some unfamiliar terms. This publication explains these terms and their use.

Acid detergent (AD) fiber and Neutral detergent (ND) fiber. These designations measure different fiber components. AD fiber, used in place of crude fiber, gives a more accurate estimation of net energy than crude fiber. A forage test is necessary to determine AD fiber because forages vary greatly. Early-cut forages have lower AD fiber and a higher net energy than late-cut forages. Legumes generally have lower AD fiber and a higher net energy than grasses at comparable stages of maturity. *Book values* for net energy in grains can be used for formulating diets because the low fiber and high net energy values for grains are quite constant. More information about forage fiber determination and feed values can be found in UMC Guides G 3150 and G 2067. Neutral detergent (ND) fiber is explained in Guide G 3150.

Net energy (NE) and total digestible nutrients (TDN). These values measure the energy in feed that is available for maintenance, growth or lactation. Net energy is expressed in megacalories (Mcal) per pound of feed and TDN in percent. Net energy is not equivalent to TDN and should not be used interchangeably. Three net energy terms are provided: net energy lactation (NE lactation), net energy maintenance (NE maint. or NE_m), and net energy gain (NE gain or NE_g).

For dairy cows, NE lactation is the correct term. NE lactation of a food includes energy for maintenance and milk production. A 1,500-pound cow producing 60 pounds of 3.5 percent milk needs 10.66 Mcal of NE for maintenance and 18.60 Mcal of NE for milk production for a total of 29.26 Mcal. If this cow is eating 25.0 pounds of alfalfa hay, she will consume 13.75 Mcal (25.0 pounds x 0.55 Mcal per pound as fed). She will need 15.51 Mcal from 20.68 pounds of grain (15.51 Mcal divided by 0.75 Mcal per pound as fed). See Table 1.

Table 1.

Total daily NE lactation requirement (1,500 pound cow)	**29.26 Mcal**
NE lactation from feeds:	
25.0 lbs. alfalfa hay x 0.55 Mcal/lb. as fed	13.75 Mcal
20.68 lbs. grain x 0.75 Mcal/lb. as fed	15.51 Mcal

For growing and finishing cattle, NE maintenance and NE gain are used separately for calculating the required energy. A 600-pound steer, gaining 2.0 pounds daily, requires 5.17 Mcal NE_m and 3.54 Mcal NE_g (see MU publication G2067). How much would a 600-pound steer eating 10 pounds of alfalfa hay and 7 pounds of grain be expected to gain daily? The answer is 1.97 pounds by the calculation in Table 2.

Table 2. Find NE_m and NE_g content of ration using values given in feed analysis report.

	NE_m Mcal	**NE_g Mcal**
10 lbs. alfalfa (as fed)	5.0 (10 lbs. x 0.5 Mcal/lb.)	2.80
7 lbs. grain (as fed)	5.88 (7 lbs. x 0.84 Mcal/lb.)	3.78
17 lbs. total ration	10.88	6.58
Mcal per lb. of ration (as fed)	0.64 (10.88 Mcal/17 lbs.)	0.39

Maintenance must be met first. Calculation of pounds of ration needed to meet the maintenance requirement of 5.17 Mcal is 5.17 Mcal NE_m divided by 0.64 Mcal NE_m/pound of ration = 8.08 pounds of ration. The remaining portion of the ration, 8.92 pounds (17 pounds - 8.08 pounds) can be used for gain: 8.92 pounds x 0.39 Mcal NE_g/pound (= 6.58 Mcal/17 pounds of ration) = 3.48 Mcal NE_g. The 600-pound steer requires 1.77 Mcal NE_g per pound of gain; therefore, 1.97 pounds (3.48/1.77) is the expected daily gain.

The amount of the ration needed above maintenance for a 2.0-pound daily gain is 9.08 pounds (3.54/0.39). Total daily intake of the mixed ration to give 2.0-pound daily gain is 17.16 pounds (8.08 + 9.08).

Total digestible nutrients (TDN) requirements for beef cattle are listed in MU publication G2067, *Nutrient Requirements for Growing and Finishing Beef Cattle*. To calculate rations, divide the animal's daily TDN requirement by the TDN level in the ration.
Example: 10.7 pounds TDN are required for a 600-pound steer to gain 2.0 pounds daily. If the ration contains 63 percent TDN (10.7/0.63), 17.0 pounds of feed is needed daily.

Unavailable protein (including heat damaged protein). This is the protein that the cow cannot digest, measured as ADF-N or pepsin in soluble protein. A small amount of unavailable protein (ADF-N x 6.25) is normally found; this is usually 3.0 percentage units or less. Amounts greater than 3 percent indicate heat damage.

Heat damage increases the amount of unavailable protein in forages. To compensate, increase the protein content of the grain or feed a different forage.

Adjusted crude protein. This is the amount of crude protein after heat damage has been subtracted. Adjusted crude protein is the same as crude protein if there is no heat damage. Use the adjusted crude protein value to formulate rations (Table 3).

Table 3. Protein fractions of normal and heat-damaged forages.

	Normal forage	Heat-damaged forage
Crude protein (%)	18.0	18.0
Unavailable protein (%)	3.0	10.0
Heat-damaged protein (%)	0 (3.0 - 3.0)	7.0 (10.0 - 3.0)
Adjusted crude protein (%)	18.0	11.0

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