Calculation TDN and NEL by Weiss

From Dr. Bill Weiss, Ohio State University, Aug, 1998

$TDN = 0.98*(100-NDFn-CP-ash-EE) + e^{-0.012*ADIN}*CP + 2.25*(EE-1)$

$\qquad + .75*(NDFn-Lig)*[1-(lig/NDF)^{.667}] - 7$

where

Neutral detergent fiber nitrogen-free (NDFn) = NDF-NDICP (% of DM)

   Neutral detergent insoluble crude protein (NDICP) =
     Neutral detergent insoluble nitrogen (NDIN) * 6.25

ADIN is expressed as a percent of total nitrogen (ADIN/N*100).
All other values are as a percent of DM.

To convert TDN to NEL (at 3X maintaince) we use the standard Moe and Tyrrell equation of:

NEL (Mcal/kg) = 0.0245*TDN - .12

General comments

1. If you have NDF digestion from in vitro or in situ that approximates 3X then that value times NDF content would replace the entire NDF component of the above equation $(.75*(NDFn-Lig)*[1-(lig/NDF)^{.667}]$

2. If you do that you must convert all other fractions to a 3X basis before transforming the data to NEL (at 3X). To do this the 0.98 becomes 0.90 (.98*.92), the CP values becomes $0.92*e^{-0.012*ADIN}*CP$ and the EE component becomes 0.92*2.25*(EE-1)

3. The value in 2. is now TDN at 3X, to convert to NEL at 3X use
   0.0266*TDN (3X) - .12 = NEL (3X) in Mcal/kg

4. We know the NFC component is overestimated for many corn silages (the equation assumes that the true digestibility of cell solubles is 98%. This number (.98) could be replaced with a value reflecting starch availability.

5. The equation above underestimates the true energy value of fat but to be consistent with the definition of TDN we maintained the 2.25. When TDN is converted to NEL the energy from fat should be adjusted. For corn silage and most forages, the effect is not worth worrying about. We hope to have better equations for the fat component in the near future.