Purpose:

To combine yield and forage quality into a single term for comparison of varieties and treatments.
How much milk will a cow produce on a given feed?

- Determine energy intake of animal
  - Energy content of feed * intake
- Determine maintenance requirement of animal
  - Weight * energy required per pound
- Subtract maintenance requirement (prorated based on forage intake) from total energy intake
- Divide difference by energy per lb of milk
How to calculate energy?

TDN or $\text{NE}_L$ is calculated from
✓ chemical analysis or
✓ in vitro digestibility
Calculating TDN

TDN (maintenance)
= tdCP + (tdFA*2.25) + tdNDF + tdNFC

- tdCP = CP * 0.93
- tdFA = 0.97 * (EE – 1)
- tdNDF = NDF * NDFD
- tdNFC = 100-CP-NDF-EE-Ash + NDFCP
  (starch & sugars)

NRC, 2001
Adjust energy to feeding level

Net energy of lactation at 3x maintenance:

\[ \text{NE}_L \ (\text{Mcal/lb.}) = \frac{(\text{TDN} \times 0.0245) - 0.12}{2.2} \]

(NRC, 1989)
Adjust intake

- NDF intake set at 1.15% of body weight
- divided by 0.3 (assuming 30% NDF in ration)
- then adjusted +/- 0.374 lbs for each 1% change in NDF digestibility above or below an average NDF digestibility

Oba and Allen, 1999
Milk from forage

Milk production =

$\frac{\left(\left(\text{NE}_L \times \text{forage intake}\right) - \left(0.08 \times 613.64^{0.75} \times \text{percent forage in ration}\right)\right)}{0.31}$
Comparison of Intake equations

\[ y = 0.8388x + 15.279 \]

\[ R^2 = 0.6633 \]
Comparison of ADF to TDN

The equation for the line of best fit is:

\[ y = -0.416x + 72.088 \]

The coefficient of determination, \( R^2 \), is 0.1214.

ADF values range from 20.0 to 80.0, while TDN values range from 20.0 to 80.0.

The data points are compared against the NRC 2001 guidelines.
Select hybrids from upper half or upper right, depending on needs.
Selecting high quality alfalfa varieties

Select varieties from upper half or upper right, depending on needs.
Summary

- Varieties and hybrids can be accurately compared for yield and forage quality using milk per acre.
- NDF digestibility improves prediction of animal performance on a forage.
- Milk2000 using NDF digestibility gives significantly different numbers than previous milk per acre spreadsheets.