

LOW COST COW/CALF PRODUCTION

The Bulletin For Alumni Of The School

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New NEMs

You can thank Joe McGinley (Lisco, NE) for this mess. He checked his forage analyses NEM values with the equation from the Student Notes and found them to be different. That prompted a call to DHI Forage Testing Laboratory in Ithaca, NY. Unbeknownst to me, they changed their method of calculation in October, 1996. The current calculation was developed at Ohio State University¹ and is used in combination with 1988 NRC energy equations.

Prediction Model

Theoretical model:

TDN = total digestible nutrients.

dCP = digestible crude protein.

dF = digestible fat.

dNFC = digestible non-fiber carbohydrates.

dNDF = digestible neutral detergent fiber.

mTDN = metabolic total digestible nutrients.

$$TDN = dCP + (dF \times 2.77) + dNFC + dNDF - mTDN$$

Model based on measurable characteristics of feeds:

CP = crude protein.

ADICP = acid detergent insoluble CP.

TDcp = true digestibility of CP.

$$TD_{CP} = e^{-0.012 \times ([ADICP + CP] \times 100)}$$

EE = ether extract.

FA = fatty acids.

$$FA = EE - I$$

NDF = neutral detergent fiber.

NDICP = neutral detergent insoluble CP.

NDFn = nitrogen adjusted NDF.

$$NDF_N = NDF - NDICP$$

Ash = ash.

Lig = lignin using sulfuric acid method.

$$TDN = (TD_{CP} \times CP) + (FA \times 2.77) + [0.98 \times (100 - NDF_N - CP - Ash - EE)] + 0.75 \times \{ (NDF_N - Lig) \times [1 - (Lig + NDF_N)^{0.667}] \} - 7$$

Please note that ADF was used in all previous formulas to arrive at TDN or net energy values. ADF doesn't even show up

¹ For original work, contact: Dr. William Paul Weiss, Associate Professor, OARDC - Animal Sciences, 311 Gerlaugh, OARDC - Wooster, Wooster, OH 44691. (330) 263-3622. E-Mail = Weiss.6@osu.edu.

in this calculation except in Acid Detergent Insoluble Crude Protein.

Don't Stop Now

The equations used to convert TDN to more applicable energy values are found in the 1988 Dairy NRC². Here we go.

DE (Mcal/lb) = digestible energy.

$$DE = TDN \times 0.02$$

ME (Mcal/lb) = metabolizable energy.

$$ME = 0.82 \times DE$$

NEM (Mcal/lb) = net energy for maintenance.

$$NEM = -0.50803 + 1.37 \times ME - 0.30423 \times ME^2 + 0.051033 \times ME^3$$

Analyses

In order to achieve the greatest accuracy in forage NEM values, some additional laboratory analyses are necessary. It is assumed that you currently are receiving CP (crude protein), ADF (acid detergent fiber) and NDF (neutral detergent fiber). In addition,

ADICP (acid detergent insoluble crude protein), **NDICP** (neutral detergent insoluble crude protein), **Lignin, Fat** (*ether extract*) and **Ash** should be requested. (*Without values for these chemical entities, DHI Lab has been using average values for the forage type*). This will add to the cost of your forage analyses. It is important since all of our calculations for requirements of all nutrients are based upon energy content of the forage. Further, predictions of animal performance depend upon forage NEM.

Other Laboratories

As you know, we have a policy of not recommending forage testing laboratories. We only ask that you use wet chemistry methods with certified laboratories. Most

of you, however, are using either the DHI Forage Lab in Ithaca, NY or Peterson Labs in Hutchinson, KS. Dennis Hogan, with Peterson, graciously supplied us with his

² Nutrient Requirements of Dairy Cattle. Sixth Revised Edition, 1988. National Academy Press, 2101 Constitution Ave. NW. Washington, DC 20418.

equations. They are using equations for calculating TDN, ME, NEM, etc., based primarily upon linear relationships with ADF. This is the same approach we always have taken. I suspect that most other laboratories are using similar calculations. Check with your favorite lab. If it is not using the energy prediction equations presented here, then do your own calculations. We've got to be on the same wave length. Soon we will have all of this set up in a spreadsheet format for easier calculations.

One More Time

A list of chemical entities and nutrients that you should request follows:

Crude Protein, ADF, ADICP, NDF, NDICP, Lignin, Fat, Ash, Calcium, Phosphorous, Magnesium, Potassium, Sodium, Iron, Zinc, Copper, Manganese, Molybdenum and Sulfur*. Once, during lush growth and once, during the dormant period, request analyses for: Cobalt, Iodine and Selenium.

Only a reminder that, as with Ranching, Nutrition is a dynamic field.

*A minimum quantity of sulfur can be estimated from 1.5% of CP.

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