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Happy Holidays from the staff of NDS-NA!!!

Welcome to NDS Newsletter

By David Weber DVM

Thanks for taking time to read our Newsletter. In our busy life it is the investment of time which is so precious. Our hope is that during this season we all will take time to count our blessings, spend time with family and friends, and remember the Reason for the Season (Lk 2:11).

NEl values in CNCPS 6.1

By Buzz Burhans PhD
NDS NA

Nutritionists who are new users of NDS and have no previous experience using CNCPS 6.1 are often concerned when the NEl value does not appear in the nutrient lists. Another frequent concern is the lower predicted NEl concentration of rations in CNCPS 6.1. Not having familiar NEl values can be disorienting when formulating and evaluating rations. However, most users quickly adapt to the changes once they understand why the NEl values calculated by the CNCPS 6.1 in NDS are different from what they are used to. Comfort with the system increases when new users develop an alternative strategy to using NEl for assessing diet energy density relative to expected animal performance for diets they are formulating or evaluating.

The lower calculated net energy of lactation (NEl) content of diets in CNCPS 6.1 is largely due to a reduction in the metabolizable energy (ME) contributed by fat in the ration. In earlier versions of CNCPS, as well as in NRC 2001, dietary fat, defined as total ether extract (EE), was assumed to pass unchanged from the rumen, and the total diet EE amount estimated to have an intestinal digestibility of 95%. In CNCPS 6.1, a fat model similar (but not identical) to the CPM fat model is implemented. In the CNCPS 6.1 fat sub model EE is partitioned into three constituents: glycerol, pigments /waxes, and fatty acids. For fat sources that are triglycerides, the glycerol portion is treated as a carbohydrate, which supplies less energy than fat. If present, the pigment/waxes portion is assumed indigestible and contributes no energy to the ration, thus reducing energy derived from EE. The remaining and major EE portion is the fatty acids. In CNCPS 6.1 each fatty acid is assigned a unique digestibility coefficient. Most of the digestibility coefficients range from 58.7% to 90%, only one (C12) is at 95%. This results in an overall fatty acid digestibility lower than the previously assumed 95%. For instance, in a ration formulated at 50 lb. DMI and containing typical ingredients and no supplemental protected fats, the weighted average fatty acid digestibility of the ration is 73%, a big difference from the old 95%. The net result of these changes is that ME from fat is substantially reduced. The efficiency of conversion of ME to NEl remains unchanged at .644; so the reduced NEl originates from the reduced amount of ME from EE, not in the conversion to NEl.

This change in energy from EE results in rations with lower calculated NEl content than expected compared to exactly the same ration in older CNCPS versions or other formulation systems. This can be disorienting because many nutritionists are used to assessing diet energy adequacy at least in part based on NEl density relative to the type and performance of the animals being fed. We essentially lost our old familiar reference values that lighted our way to a satisfactory diet. However, validation work at Cornell using the new ME values shows that the accuracy of allowable milk predictions has been improved. CNCPS 6.1 makes better

Please see *NEl values in CNCPS 6.1* on page 3

Indigestible versus Undigested NDF- The Distinction and Utility for NDS Users

By D.R. Mertens
Mertens Innovation & Research LLC

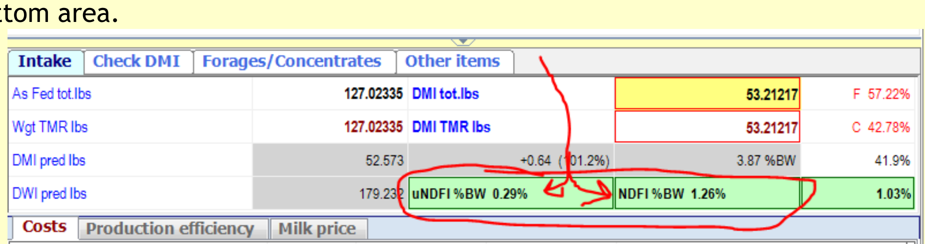
Background: The concept of NDF indigestibility was introduced in the late 1990s and is used in modelling digestion kinetics of feeds. The concept resulted from the observation that, as fermentation time (in vitro) increased, the disappearance of NDF was less than 100%. This implied that some NDF would remain and not be digested, even if fermentation extended to infinite time. Logically, coefficients for kinetic rate descriptions can only apply to potentially digestible feed fractions. Therefore, estimating indigestible iNDF is crucial in describing the kinetics of NDF digestion.

In models such as CNCPS, feed fraction pools such as indigestible NDF (iNDF) are really hypothetical concepts defined by the particular model being considered. Models for describing fiber digestion are evolving, and some new models will contain three pools of NDF (fast, slow, and indigestible) instead of the two pools of NDF (potentially digestible and indigestible) that appear in many current models such as CNCPS or NRC 2001. The iNDF for a two-pool model (iNDF2) is not the same pool as the iNDF for a three-pool (iNDF3) model, but both are hypothetical concepts that attempt to describe “true” indigestibility of NDF. Such three pool models are likely to replace our current two-pool models, so having a consistent system of terminology and acronyms for the pools in the NDF models and for laboratory results recommended for estimation of iNDF makes sense.

iNDF versus uNDF: Measuring iNDF directly would take infinite time and none of us can wait that long lab results ☺. What is measured in the laboratory is the proportion or amount of NDF that is undigested after a specified fermentation time ($uNDF_{72}$, $uNDF_{120}$ or $uNDF_{240}$). Conceptually, iNDF never changes for a particular model, but the way it is estimated from laboratory uNDF results can vary as analytical methods differ or are improved. Whereas, iNDF by definition occurs at infinite time, uNDF varies with fermentation time. Measurement of uNDF also varies with donor animal and its diet, sample grind size, fermentation technique (in situ or in vitro), vessel (bag or flask) and residue recovery vessel pore size (bag, crucible, or crucible with filter mats). Although there is an obvious relationship between the two (an estimate of iNDF can be derived from uNDF), they are not the same.

The determination of iNDF will change with future changes in the NDS/CNCPS model such as moving from a two to a three pool model for NDF, and uNDF will also change with improvements in laboratory procedures for its determination.

iNDF use by NDS users is inherent in use of NDF fermentation rates in the NDS software. uNDF is also an important concept for NDS users to understand as well, because it A) is the laboratory basis for the estimation of iNDF, and B) its estimation within the model can provide information about expected dry matter intake. In NDS uNDF is expressed as a percentage of bodyweight, and can be used to assess expected DMI based on both experience and on peer reviewed literature that has described the relationship of uNDF and DMI. uNDF as a percent of bodyweight can be found on the ration screen of NDS on the left side middle/bottom area.



*Adapted with permission from a copyrighted document 2013 Mertens Innovation &Research LLC. Note: a more extensive version of the discussion of iNDF and uNDF by Dr. Mertens can be found on the website www.rumen.it

Tips for your NDS!

- The new Sheep Model is available
- There is a new Dry Mater adjustment on the Mixer Wagon Reports
- You can now edit AA as % of CP, and not only as % ISR(as required in the new 6.5)
- The NDS Fat Sub-Model for prediction of % and yield has been refined
- On the Recipe page under the Fatty Acid tab there is a new icon that gives you the Jenkins Fat checker.

NEl values in CNCPS 6.1 from page 1

predictions about allowable milk than earlier versions.

With experience, over time new NDS users adapt to a new set of mental reference “benchmarks” for assessing dietary energy density. With lactating diets, this is easy, as many people use the ME allowable milk to compare two rations (green circle on graphic). If two rations have the same ME allowable milk, and assuming the MP supply is adequate and that intakes are the same, the rations are likely comparable. If one has a higher ME allowable milk, it is probably the more energy dense one. This use of ME allowable milk can be a useful reference point for assessing the rations. *However, ME allowable milk will be different for the same ME supply if the model inputs are different.* Changing the temperature, or the butterfat content, or the bodyweight or the expected growth for instance all change the ME requirement so the same amount of ME allows different amounts of milk. Thus use of ME allowable milk works as a comparison reference only when the inputs are the same.

There are several other ways to gauge the relative suitability of dietary energy supply. When comparing diets, compare ME supply rather than ME allowable milk (black box on graphic). This allows focus to be on the supply / diet side without confounding by animal or environmental inputs.). Monitoring the ME balance can be very useful (brown box on graphic). Another aid is observing ME as a density by looking at ME / lb. or kg. (red box on graphic). Those that monitor ME/lb or kg regularly will develop a perspective on where they need to be, which will allow this metric to be used similarly to the way many previously used NEl density to know where energy density needed to be for a given animal type and performance. Of course, similarly, one can monitor the actual NEl density as well, because calculated NEl density is also available (blue box on graphic). However, this reported NEl density reflects the changes in ME supply in CNCPS 6.1 as described above, as well as other more minor changes not discussed here, so this NEl density will be lower than what one would expect if the nutritionist is not experienced with CNCPS 6.1. As the new NEl or ME densities are used and become more familiar, these values become more useful as indicators of the relative suitability of the diet energy density. In NDS one can also monitor the NEl density of the diet using the NEl value as calculated by the NRC 2001 which can be added to the nutrient list (purple box on the graphic). In most cases, although not in the example on the graphic, this NEl 3x NRC density (purple box) will be greater than the density calculated via CNCPS 6.1 (in blue). However, those accustomed to NEl values derived from other earlier algorithms such as NRC 1989 will find either of these is lower than expected when derived from older algorithms.

For dry cows, the option of comparing ME allowable milk as a reference mark cannot be used. Assuming that model inputs are correct, monitoring the ME balance (Brown box on graphic) is very useful (and important) in formulating dry cow diets, especially for far-dry cows. Some formulators use the 6.1 NEl density reported in NDS as a mental reference point for dry cow rations, with the expectation that the 6.1 derived NEl density will typically be somewhere near 3 or 4 points lower than the NEl values they were accustomed to previously.

Remember, the NEl 3x NRC is available in the nutrient lists; the NEl in the NCPS box in the center of the ration screen is the one derived from the CNCPS 6.1 ME values. If the 6.1 NEl is not showing on your screen, click the checkbox where the red arrow is on in the upper left corner of the graphic to add it to your screen.

NCPS | Milk quality | Performance

	Supply	Balance	% Req.	Milk lbs
ME Mcal/day	56.94	0.35	100.6	75.68
MP g/day	2,477.3	5.9	100.2	75.28
NH3-N g		97.4	157.5	
peNDF lbs	12.09	0.34	102.9	23.66 %DM
Forage NDF lbs	13.08	0.03	100.3	74.7 %NDF
Gain 1 BCS	1,596	days		
Met g	47.1	7.3	118.3	1.90 %MP
Lys g	162.6	30.4	123.0	6.56 %MP
His g	63.0	17.2	137.7	2.54 %MP
Lys:Met		3.45:1		
ME Mcal/lbs	1.11			
NEl Mcal/lbs	0.72			
NEm Mcal/lbs	0.71			

NEl 3x NRC	Mcal/lbs	0.72	36.85	-
ADF	%	22.77	5,274.35	
aNDF	%	34.32	7,950.35	-
ADL	%	3.61	836.56	
Forage NDF adj.	%	25.62	5,935.26	-
rNDFTOfB1	gr/gr	0.01	1.60	
NSC_2	%	25.74	5,963.88	
Sugar	%	4.34	1,004.47	-
Starch	%	21.41	4,959.42	-
Soluble Fiber	%	8.57	1,984.97	-
EE	%	4.55	1,053.49	-
TFA	%	3.53	818.76	
C18_123	gr	2.38	550.35	
fNDFd	%	0.60	137.94	
Ca	%	1.48	343.33	-
P	%	0.30	70.06	-
Mg	%	0.22	49.92	-

NDS PROFESSIONAL
NUTRIMIX

NDS North America Group
E-mail: ndsrumen@gmail.com
rumendvm@gmail.com
Phone: (316) 841-3270

RUM&N
RUM&N Sas
Via Sant’Ambrogio, 4/A
42123 Reggio Emilia - ITALY