

uNDF240 and MIR kd rates



Dairyland continually strives to provide real value for your forage testing dollars and in keeping with this tradition we have added **undigested NDF (uNDF240)** and **Mertens Innovation Research (MIR) kd rate** calculations for fiber to our analytical offerings.

What is undigested NDF (uNDF240)?

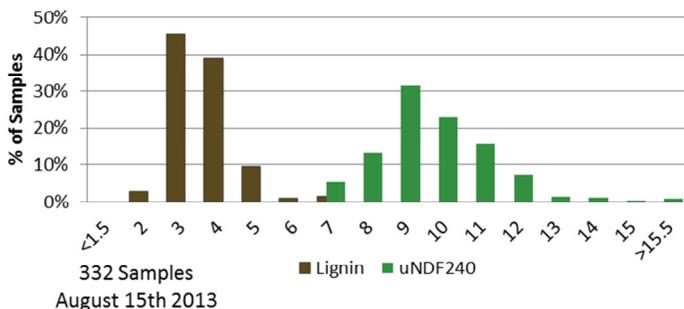
By definition, indigestible NDF is the amount of NDF in a feedstuff that will never be digested. This is typically measured by In Vitro or In Situ methods with very long fermentation times. In theory, the amount of truly indigestible fiber only occurs at infinite time and it can only be estimated using the amount of undigested fiber at some time point shorter than infinity. Therefore it is common to see iNDF (indigestible NDF) and uNDF (undigested NDF) used interchangeably.

uNDF240 vs Lignin chemistry analysis.

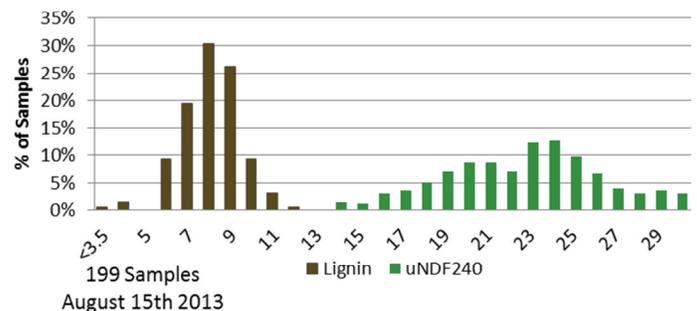
Lignin has been a useful educational tool to help people understand that some portion of fiber is indigestible. However, as a chemical analysis, lignin is a crude measurement in comparison to other common analysis like CP, ADF, and NDF. The official AOAC procedure for lignin uses the same equipment and technique to measure lignin (2-12 % in forages) as it does for ADF and NDF (20-80% in forages).

In comparison, uNDF240 in forages has a higher mean value and a much broader range than lignin. These factors make uNDF240 a much more useful tool for differentiating forages.

Corn Silage Lignin and uNDF240
% DM



Haylage Lignin and uNDF240
% DM



uNDF240 vs Lignin NIR analysis

The same characteristics of uNDF that make it a better chemistry analysis than lignin also make it a better constituent by NIR. Calibration statistics can be complex, but in layman's terms Dairyland finds uNDF240 calibrations to be at least 2x as accurate as lignin calibrations.

Corn Silage	Mean	SEC	RSQ	SECV	1-VR
Lignin	3.34	.73	.75	.75	.74
uNDF240	8.22	.74	.93	.78	.94
Haylage	Mean	SEC	RSQ	SECV	1-VR
Lignin	6.19	1.20	.77	1.27	.75
uNDF240	18.5	1.46	.94	1.60	.93

Why Dairyland uNDF240?

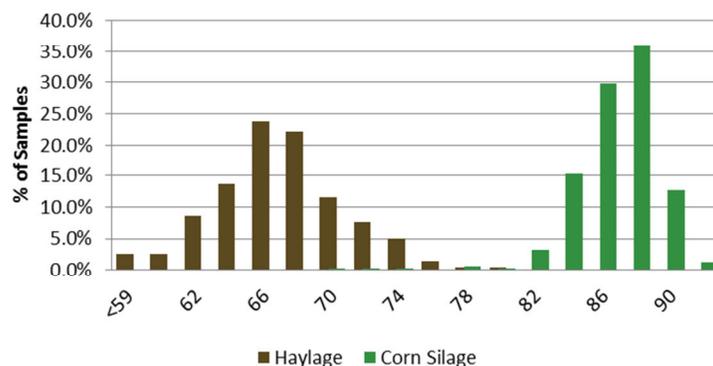
Dairyland Laboratories has continuously refined and improved In Vitro NDF analysis since we introduced these analyses in 1998. Working closely with Dr. Mertens we began developing our method over a period of 2 years based on the time tested industry standard Goering and Van Soest In Vitro method and the official AOAC (crucible) method for NDF analysis.

uNDF240 in ration balancing

uNDF240 has many uses in ration balancing including rate calculations for NDF digestion, as an indicator of rumen fill and intake potential of a diet, and as a tool for comparing forages.

While RFV and RFQ are more commonly understood for evaluating forages, uNDF240 gives users the ability to calculate the D-Value of a feed, which is a potentially more useful number. Commonly used in Europe, the D-Value of a feed is the amount of digestible organic matter per unit of dry matter, or simply the percentage of a feed sample that is potentially digestible. To calculate the D Value, a user can use the following formula: $D\text{-Value} = (1 - (\%Ash + \%uNDF240))$

D- Value (Digestible OM%DM)

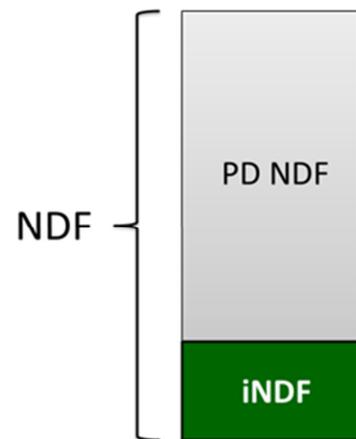


In addition to the D-Value, uNDF240 has a strong relationship to rumen fill and dry matter intake. Numerous studies have shown a relationship between NDF content and intake, as well as NDF digestibility and intake. Mertens (1979) suggested that a 1% decrease in indigestible fiber results in an increase of 1% in maximum digestible dry matter intake. Lippke (1986) also suggested that maximum iNDF consumption is about 20g/kg BW^{0.75}. It is likely that further research will show that there is fairly specific limit to how many lbs per day of iNDF can be consumed by an animal of a specific body weight.

uNDF240 in rate calculations

Since the rate of fiber digestion (kd rate) only applies to the potentially digestible fiber in a feed, correctly defining the amount of potentially digestible fiber is crucial to calculating the correct rate. Traditionally, the indigestible fraction has been calculated by multiplying lignin x 2.4. The primary drawbacks to this traditional system are that lignin is not a precise analysis, nor does it have a fixed relationship to indigestible fiber. For example, lignin in corn silage has a different relationship with indigestible fiber than lignin in alfalfa.

uNDF240 enhances NDF rate calculations because it is a uniform fraction across all feeds and more precisely defines the potentially digestible NDF pool.

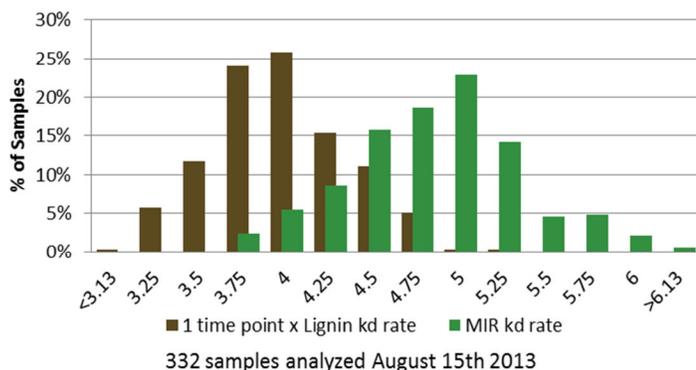


Mertens Innovation and Research (MIR) kd rates

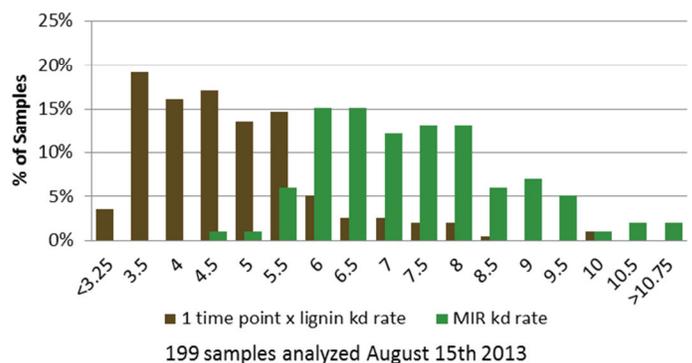
Dr. David Mertens (formerly with the US Dairy Forage Research Center) is a highly sought after expert for his understanding of forage quality as it relates to dairy cow nutrition. Dr. Mertens studied under Dr. Peter Van Soest, who created the detergent fiber system of forage analysis. Dr. Mertens has been a renowned expert in the area of fiber digestion since his 1973 Ph.D. dissertation on "Application of Theoretical Mathematical Models to Cell Wall Digestion and Forage Intake in Ruminants".

Dairyland is excited to announce that we are now providing Dr. Mertens trademarked MIR kd rate calculations. These rates are based on In Vitro analysis of multiple NDFD time points and uNDF240. Users will find these kd rates to be a significant

Corn Silage kd rate Distribution



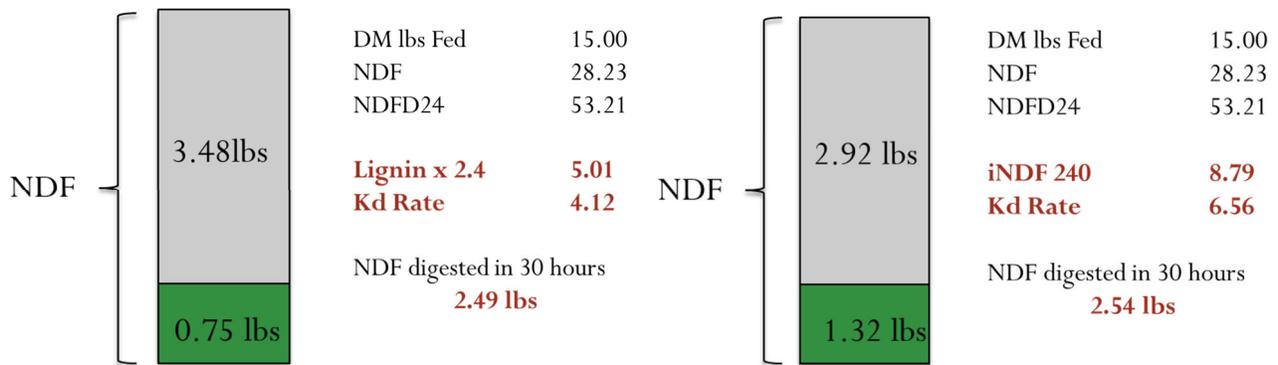
Haylage kd rate Distribution



improvement over single time point calculations, in addition to the advantages of using uNDF240 instead of lignin. The MIR kd rates are more stable, accurate, and have a larger range than the traditional single time point and lignin rates.

Attention CNCPS rate users!

For users who would like to use the MIR kd rates in a CNCPS based model it is crucial to be able to input both the uNDF240 value and the MIR kd rate. These are a matched set of values and must be used together. Mixing the MIR kd rates with lignin, or a traditional 1 time point rate with uNDF240 will result in significant errors. For ration balancing systems that do not allow a direct iNDF input, Dairyland can provide the Lignin input (uNDF240/2.4) that should be used with the new MIR rates.



MIR kd rates will be higher, but the use of uNDF240 makes the potentially digestible NDF pool smaller. Conversely, lignin based rates will be slower but lignin x 2.4 results in a larger potentially digestible NDF pool. When used as matched sets, both systems result in similar amounts of predicted NDF digested.

N5- CNCPS with MIR kd rates (\$23.75/sample) - Dairyland’s new CNCPS package will include the MIR kd rates as well as the traditional Van Amburg kd rates.

References

Lippke, H. "Regulation of Voluntary Intake of Ryegrass and Sorghum Forages in Cattle by Indigestible Neutral Detergent Fiber." *Journal of Animal Science* 63 (1986): 1459-468. Print.
 Mertens, D.R., and L.O. Ely. "A Dynamic Model of Fiber Digestion and Passage in the Ruminant for Evaluating Forage Quality." *Journal of Animal Science* 49 (1979): 1085-095. Print.