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Utilizing uNDF in Dairy Cow Diets: A new way of looking at forage fiber

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Utilizing uNDF in Dairy Cow Diets

A new way of looking at forage fiber

December 4, 2017

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What is NDF?

NDF is neutral detergent fiber. It is that which remains after boiling for one hour in neutral detergent. NDF is primarily cellulose, hemicellulose and lignin, but it can contain some silica from soil contamination and some bound protein. NDF is negatively correlated to feed intake, in other words as NDF increases dry matter intake decreases. Recently several laboratories (USDA, Cornell, and Miner) have been investigating the carbohydrate pools and that which is readily utilized (fast pool), slow pool or that which is considered undigestible or uNDF.

What is uNDF?

uNDF is the opposite of digestible NDF or $= 100\% - \text{uNDF} = \text{digestible NDF}$ sometimes referred to NDFD. uNDF is defined as the residue remaining after a specified amount of digestion usually 240 hours for forages and 30 hours for non-forage sources. uNDF differs from indigestible NDF or iNDF which implies that iNDF that will never be digested. uNDF serves as an estimate of iNDF. It also differs from lignin, because the assay for lignin is crude and not as specific, while some lignin can be digested.

Is uNDF bad for the cow?

Not necessarily, uNDF contributes to rumen health by contributing to the rumen mat which is needed for rumen health and rumination to maintain the rumen environment. All forages will have some uNDF.

How can uNDF be used?

It allows us to partition the NDF into pools, fast and slow. Highly digestible NDF forages like BMR will have much higher potentially digestible NDF than lesser digestible NDF forages.

Values of uNDF.

Cotanch reported that corn silage, legume silage and grass silage had tremendous variations in uNDF in 2015. For instance the DairyOne report from May 2015 showed corn silage uNDF ranged from 2-25.5 %, legume silage ranged from 5.5-31.7%, and grass silage ranged from 2.3-44.8%.

What do the fast and slow carbohydrate pools contribute to the cow?

The fast pool (that which is broken down in less than a day) results in the production of propionate which ultimately becomes glucose and potentially lactose. Lactose is the regulator in the mammary gland of milk volume (the more lactose the more milk). It also contributes to the microbial pool which ultimately is the best protein source to the cow.

The slow pool or the uNDF provides for the rumen mat, which results in rumination and saliva production and ultimately the maintenance of the rumen pH. It too contributes to microbial protein by helping to maintain a hospitable environment for the microbes to flourish. It also contributes to the production of milk fat.

So how much should I feed?

Data from the Miner Institute indicates that about 5.7 pounds of uNDF is the optimal amount or about 8.7% of the high cow diet. The Miner Institute observed that in their high group which averages 120 pounds of milk per day 5.7 pounds of uNDF or 0.32% of body weight or 8.5% of TMR dry matter was optimal for that level of production. In the following year, with different forages, uNDF increased to 7.5 pounds or 0.41% of body weight while milk yield dropped by 15 pounds. It appears that low groups need less uNDF and require about 4.6 pounds per day or about 8.7% of TMR dry matter.

How can I implement this new means of feeding my cows?

More and more forage laboratories are providing estimates of uNDF. Work with you feed representative to develop new rations to meet these new developments.

References

Cotanch, K. 2015. uNDF perspectives: How it relates to DMI, rumen fill, stage of lactation and possibly more. Penn State Extension Dairy Cattle Nutrition Workshop.

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