

## Taking Advantage of Better Digestibility with Feeds...

Neutral detergent fiber (NDF) digestibility is positively related to feed intake, milk production, and body weight gain in dairy cattle. We are learning what laboratory measurements best predict the NDF digestibility of forages and how to effectively use these NDF values in ration evaluation and formulation. This [article] provides a template for deciding how to use NDF digestibility on-farm, including the impact of cow management on response to improved fiber digestibility.

To fully appreciate and properly interpret NDF digestibility values, we need to understand the relationships among cell wall structure, ruminal digestion, and dietary/management factors that all impact the animal's response to forage with a specific digestibility.

It is the complex series of interactions between these entities that ultimately determine the NDF digestibility of forage when fed to cattle. Chemical properties of the forage (primarily lignin) and three-dimensional structural attributes of the plant cell comprise the physiochemical matrix that the microbial population must interact with. While the process of fiber fermentation is occurring, dietary and management factors will influence fiber digestion and passage rates from the rumen and consequently the total time a forage particle will stay in the rumen. Ultimately, all of these factors determine cow response in terms of feed intake and milk yield. Given the complexity of this process, it is actually incredible that we can estimate the NDF digestibility of a forage sample as accurately as we sometimes do with only a 1-gram sample (usually dried and ground)! Remember this "big picture" of factors influencing NDF digestibility when interpreting lab results and what to expect for any on-farm scenario.

From a nutritional perspective, acid detergent fiber (ADF) is correlated with digestibility of a forage or feed because it contains primarily lignocellulose, and lignin is the major plant compound that limits ruminal cell-wall carbohydrate digestion. Neutral detergent fiber (NDF) is correlated with feed intake because it measures the complete plant cell wall (cellulose, hemicellulose and lignin) that is typically bulky and takes up space in the rumen. The NDF content of forage is also positively related to chewing response during eating and rumination. Here are general guidelines to assess the adequacy of dietary "chemical" and "physical" fiber in rations.

### Chemical NDF:

- 28-32% of ration, DM basis
- minimum ~25% (NRC, 2001)
- 1.2% of BW as total NDF intake maximum
  - o  $1350\text{-lb BW} \times 0.012 = 16.2\text{ lb NDF intake/day}$
  - o upper limit for NDF intake/day in many situations

### Physical NDF:

- 550-600 minutes of rumination/day
- ~60% of resting cows should be ruminating
- Ruminal pH >5.8
- ~5-8% of particles >19mm sieve (top sieve) PSU Particle Separator
- peNDF >20% of DM

## PLANT CELL ANATOMY & RUMEN DIGESTION

We usually envision plant cells as two-dimensional squares as illustrated in most textbooks. But, to fully understand how microbes interact with a forage fragment, we must think of the cell as being three-dimensional; in other words, the plant cells are boxes that bacteria must enter. And, entering and moving through these boxes, digesting NDF as they journey through the plant cells, takes time to accomplish. When we evaluate a NDF digestibility value like 30-hour NDF digestibility, we are really evaluating how much distance the bacteria traveled through the plant cells in 30 hours. The most important microbes for fiber digestion are bacteria and fungi.

## NDF DIGESTIBILITY & PERFORMANCE

Research clearly demonstrates the importance of high quality, high-NDF digestibility forages for optimal milk production. As NDF digestibility of forage increases, researchers have observed the following responses:

- greater dry matter intake
- increased milk yield
- higher peak milk yield and greater persistency
- less body weight loss in early lactation
- better body condition
- improved reproductive performance

The benefits of feeding diets with higher amounts of digestible NDF include:

- increased energy intake
- higher ruminal pH
- increased acetate: propionate and better milk components
- minimal lactic acid and less acidosis risk
- greater bacterial protein production and less need for expensive RUP supplements
- indigestible NDF interferes with digestion and absorption of starch, protein and fat
- constant supply of absorbed nutrients resulting in more milk production

Small increases in NDF digestibility can result in highly economical increases in milk yield, body condition and reproductive performance.

*(from an article by Dr. Rick Grant, W.H. Miner Institute, NY)*

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**VOLUME 5 – Number 10 – October 2006**

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# Nutronomy...

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**PLANNING FOR WINTER** ~ The cold winds of winter will soon begin to blow, bringing with them a reality of declining temperatures, the chance for snow, and a possibility of added chores from frozen pipes and broken equipment. Winter presents many challenges! However, we can enjoy the interlude of fall – a chance to prepare for the coming winter! The silage is been cut and stored, samples have been sent for analysis to ensure a more accurate ration in coming weeks/months and [hopefully] you have calculated available forage inventories. Now is a good time to turn your attention to "other things" around the farm that can help to make winter a bit easier. This includes checking that machinery is properly winterized, heat tape(s) are in working order, and that adequate feed is on-hand. Preparing now can save you hours of time (and frustration) during less than hospitable weather!

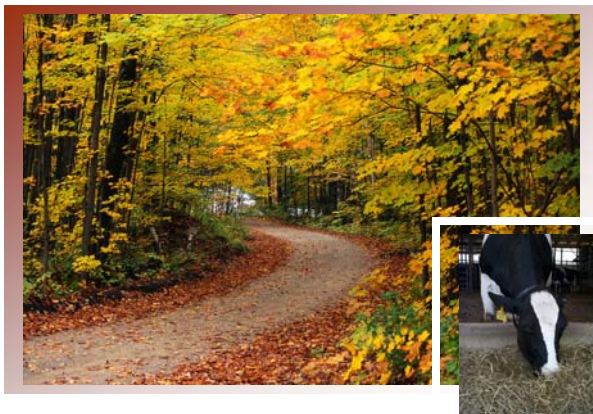


**A POINT TO PONDER...** Have you noticed the leaves changing color? This is a beautiful time of the year, with leaves changing from green to varying shades of yellow, orange and red. Add to this the festive look of pumpkins and brightly colored mums... and enjoy the rustic scenes of October. It is a busy time around the farm preparing for winter. Take time to appreciate the beauty that surrounds us in the fall! This is among the many pleasures we have of living "in the country." And while you are "breathing in the landscape," enjoy a cup of hot chocolate or spiced apple cider with family and friends, and consider the multitude of blessings we have.



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## October...

*feeding for results!  
winter on the way ~ are you prepared?  
planning for 2007.*

*Check it out.*