



Fiber Digestibility Drives Milk Yield

•BY Jane Fykse for AGRI-VIEW REPRINTED WITH PERMISSION

MADISON, Wis. – Farmers and University of Wisconsin researchers are rethinking forage management and feeding. They want to maximize nutritional value and profit since introductions of low-lignin alfalfa, brown-midrib-corn silage varieties and improved grasses.

UW-Madison Dairy Scientist Dr. Dave Combs recently shared forage-analysis insights at the Professional Dairy Producers of Wisconsin's 2017 Business Conference in Madison.

Producers are after greater digestibility and intake potential. Driving both are lower fiber content of the forage and greater forage. Thus, producers need to pay attention to both Neutral Detergent Fiber (NDF) and NDF digestibility when assessing forage quality. Relative Forage Quality (RFQ), a traditional forage-quality measure, still discounts grasses more than it should.

Recent innovations are impacting forage feeding.

- Corn shredlage brings greater starch digestibility.
- Brown-midrib-corn silage improves fiber digestibility.
- Reduced-lignin alfalfa improves NDF digestibility.
- Improved grasses for high-producing dairy cows have greater fiber digestibility than alfalfa and corn silage. With high-starch diets that hold potential for laminitis, there's definitely a place for grasses. New grass alternatives carry more nutrition than wheat straw, while also adding chew factor to cow diets.
- Farmers are likely seeing new forage-analysis measures and terms on laboratory reports. Included will be NDFom — or NDF on an organic-matter basis; uNDF240 — or undigested NDF at 240 hours; and kd, which measures rate of fiber digestion.

Discussing cow-performance swings from Total Mixed Rations (TMR), a diet's Total Digestible Nutrients (TDN) are impacted largely by carbohydrates from starch and fiber. It's a combination of forage nutrient content and digestibility that impacts how well cows will produce on a given diet. While fiber is always lower in energy than starch, a two- to three-unit drop in either fiber or starch has been shown to decrease milk production by about a pound per cow per day.

Start with forages to build a TMR.

That means looking first at the forage analysis. Here is a "quick list" for reading a forage analysis:

- 1) NDF and starch
- 2) Protein in grasses and alfalfa



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3) Ash content

Good-quality corn silage is typically 2 percent to 3 percent ash. Grasses are 6 percent ash and alfalfa is 8 percent ash. Above those benchmarks means cows are being fed too much dirt contamination. Every 1 percent ash means 1 percent less TDN provided by the feed. Dirt isn't just picked up during harvest either. It can also be added when tapping into bunkers or bags. Work with your feeders to help limit ash content.

It's also important to evaluate digestibility, keying on Total Tract Neutral Detergent Fiber Digestibility (TTNDFD) as well as Starch Digestibility. Fiber digestibility varies in forages. Here are typical ranges of TTNDFD, expressed as a percent of NDF.

- Alfalfa hay and silage – 25 percent to 70 percent
- Corn silage – 25 percent to 80 percent
- Grass hay and silage – 15 percent to 80 percent

Fiber digestibility also varies with

- how mature the forage is?
- forage genetics such as low-lignin alfalfa or BMR.
- growing conditions
- harvest management.
- Fiber digestibility has a big impact on milk yield. A two- to three-unit change in ration TTNDFD corresponds to a 1 pound per cow per day change in milk yield.

The TTNDFD measurement was developed to predict fiber digestibility in high-producing dairy cattle. It can be used across forage types and byproduct feeds, and in ration balancing and evaluation. It is a more accurate measure of forage quality than RFV or RFQ.

Both the feed itself and cow factors such as the feed's rate of passage (kp) in the cow affect TTNDFD – a measure developed by the University of Wisconsin – considers both feed and cow factors to measure true fiber digestion. TTNDD is a prediction of NDF digestibility for a feed or diet of a hypothetical 1,400-pound cow consuming 53 pounds of dry matter of a 28 percent to 30 percent NDF diet.

Farmers might think about TTNDFD in terms of how far they can travel on a tank of gas. It depends on both the size of the tank and miles traveled per gallon of fuel. Similarly, a forage's milk-yield potential depends on the amount of potentially digestible NDF — pdNDF — and rate of fiber digestion (kd) by the cow.

It's not easy assessing fiber digestibility. It involves collecting manure, washing it in a small-mesh sieve and looking for relatively large undigested pieces of fibrous feed. But when working with a farm's nutritionist, such a visual inspection of the digested fiber content of manure is worth doing.



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Shoot for rations with TTNDFD greater than 42 percent. Forty-two percent is the average TTNDFD values of both dairy-quality alfalfa and corn silage.

Dairy-quality alfalfa and corn silages will be less than 40 percent (Neutral Detergent Fiber) with a TTNDFD value of at least 42 percent.

A producer might even set a TTNDFD goal of 48 percent or above. While 42 percent TTNDFD is average for alfalfa and corn silage. Alfalfa and corn silage with exceptional quality carry TTNDFD values of 48 percent or greater.

Grasses for lactating cows should be less than 45 percent NDF. The average TTNDFD value of grasses is about 44 percent, with good-quality grasses above 50 percent TTNDFD.

Many confinement dairy producers still perceive grass to be too high in fiber and too low in quality for high-producing dairy cows. They prefer corn silage as a higher-yielding alternative to perennial or annual grasses. Many think pure alfalfa stands are easier to manage. However, pasture-based dairies have challenged perceptions about grass and created more grass-research opportunities.

The reality is that high-quality grasses can be an integral part of rations for high-producing cows, are an excellent source of highly digestible fiber and fit well into cropping systems. And TTNDFD is the tool that can optimize grass utilization.