



## Unlocking calories in fiber

**O**VER the past decade, I've drifted away from my fibrous roots. Under Dave Combs at the University of Wisconsin-Madison, I spent several years researching fiber and fiber digestion in dairy cattle. Dating back to the 1970s, Cornell University's Pete Van Soest led a new wave of scientists in redefining fiber in dairy diets. I followed in his and Combs' footsteps. I also learned from renowned statistician Doug Bates in a graduate level statistics course that fiber degradation in the rumen could be thought of akin to drug clearance from one's body. When you take a pain reliever, the drug absorption and eventual clearance from the blood stream is not instantaneous, nor is it linear.

### Past research holds its value

Fiber degradation in the rumen is similar to drug clearance, and maybe even more complex. There's an undigestible fiber component that is never degraded. Think of it like concrete. Then there's the potentially digestible portion that breaks down like wood in a campfire, starting slowly and then taking off. This continues to be a dairy nutrition and forage management topic that is dear to my heart, though I've strayed from talking and writing about it in depth the past few years.

Looking back at my column archives, outside of the article titled "The physical side of fiber" published in the April 25, 2024, issue, it has been years since we've covered fiber digestion here. For example, see if you can go back and find the article titled "Dairy nutrition's tribal language: Speaking fiber" in the March 10, 2018, issue. This is a great companion article to find, with a classic graphic that's helpful to understand the detergent system for fiber analysis that Van Soest developed. I want to offer kudos to Virginia Tech's Gonzalo Ferreira

for drawing me back to my desk to write about fiber again.

Ferreira's recent *Hoard's Dairyman Intel* article titled "Bringing a complex fiber topic down to earth" was excellent. It matches my 2018 article with a graphic detailing a simple nonlinear case where fiber degrades at a constant rate per hour. While this graphic might be a bit tough to grasp, it's a must-see. I've drawn curves such as this one countless times in meetings with professionals to talk through different fiber digestion issues. I'm further drawing your attention to this graphic because it represents the most simplistic fiber breakdown scenario. It's fundamental to picturing fiber digestion in your mind.

### A slow start

In reality, I think fiber degradation in the rumen looks a bit more complicated than a first-order kinetics graphic. Follow with this train of thought as we dip into new crop corn silage.



**THIS YEARS** corn silage quality has varied across many parts of the nation.

Think about a campfire and the heat associated with it. To get a fire started, we need a flame and some kindling. The process is slow to start, but a bit of kindling's heat and energy gets the bigger burn started. This kindling phase is like what happens when fiber is consumed,

chewed, and saturated with rumen fluid. The rumen fiber digested bacteria are in the liquid phase, so the feed must get saturated and mixed with fibrolytic bacteria before digestion can take place. The bacteria need to attach before they begin their digestion work. This process is not instantaneous, just like kindling to start the campfire.

As the campfire gets going, we recognize that hard wood will burn longer and with more sustained heat than soft wood, though the soft wood might burn easier, thus giving us heat quicker. Hard versus soft wood is like corn silage fiber versus alfalfa fiber. As Ferreira detailed, corn silage has more potentially digestible fiber, but it digests at a slower rate. On the other hand, alfalfa has less potentially digestible fiber, but it burns quickly. The net outcome when comparing and contrasting the two is actually a similar total tract NDF digestion (TTNDFD). Combs recognized this fact 10 to 15 years ago and built the University of Wisconsin (UW) TTNDFD model to more accurately account for fiber digestion in dairy cows across different forage species.

There are many different fiber digestion metrics now reported by feed analysis laboratories and different ration balancing models or philosophies to use this information. Still, the basic concept to take home from this month's column is that unlocking calories in fiber is much like that of a campfire.

### Crop curve balls

A single, 30-hour fiber digestion measure can prove to be a reasonable index to compare within a forage species. However, fiber digestion can't be adequately characterized with a single data point. This concept is important because the 2024 corn silage was a mixed bag in accordance with planting date and

growing conditions. For regions that had plenty of moisture during the first half of the growing season, the average 30-hour fiber digestion estimates are down. However, the UW TTNDFD model is simultaneously forecasting a more substantial drop in fiber quality year over year. This divergence in fiber quality assessments ties back to the complex nature of fiber digestion that Ferreira has better explained.

While we've learned a great deal in the recent decades since Van Soest's initial research, I expect that we'll continue to need at least some feedback from the cows to fully understand how new-crop forage will feed when included in today's rations. 🐮

The author is the animal nutrition director at Rock River Lab Inc., in Watertown, Wis., an adjunct professor at the University of Wisconsin-Madison, and a consultant with Cows Agree Consulting LLC.

Used by permission from the February 2025 issue of *Hoard's Dairyman*.  
 Copyright 2025 by W.D. Hoard & Sons Company, Fort Atkinson, Wisconsin.