If we were in the poultry, swine, or even the feedlot business, we would be familiar with terms such as feed efficiency. Ironically compared to the dairy producer, these livestock enterprises can monitor impacts on efficiency when they market their livestock. We as dairy producers, though, have an advantage. We can monitor the responses to changes in milk production on a daily basis. Yet our colleagues dealing with other species are the ones who have adopted measures of profitability, such as feed efficiency, long before we have.

Conventional wisdom has led us to believe that more feed equals more milk which in turn equals more profits. Genetics, feed, computer and automation technology, and aggressive health and breeding programs have allowed us to live by this belief. Add to that the lower feed costs from living in a country where grain and forage has been abundant, and it has been a simple and mathematically sound equation, until now.

The cow has changed genetically, but also our nutrition and what we know about converting feed to milk has improved dramatically. While the potential for higher milk plateaus seemed endless, logic would dictate the theory of diminishing returns had to enter the picture sooner or later. When resources become limited, laws of economics have taught us to get more efficient with our inputs. Nothing holds more true to this than the present feed costs.

Both terms ‘feed efficiency’ and ‘dairy efficiency’ are being used synonymously to describe improvements in feed conversion to milk production, but dairy efficiency should be reserved to describe and include many areas of management that impact the conversion of inputs to outputs such as overall management, labor, finance, herd health, facilities, reproduction, cull rates, replacement management, etc. ‘Feed efficiency’ is merely a component of the overall dairy efficiency factors.

“How can you get to where you want to be if you don’t know where you are?” Consequently, once we know what our current efficiency range is, then we can begin to calculate with intelligence what is the real cost of getting another 1 pound of milk; 5 pounds, or even 10 pounds of milk, but more importantly, we must ask ourselves, is it the right path to increased profitability?

As dairy producers, nutritionists, veterinarians, accountants, bankers, etc., our jobs will be to find our herd’s efficiency range, and then strive to improve it while recognizing all inputs that affect its parameters.
By measuring parameters such as dry matter intake, income over feed cost, cost of mastitis or reproductive disease incidences, cost of replacement, feed refusal range and lost opportunities, we can begin to determine our current efficiency.

The following parameters can increase feed efficiency (FE) and dairy efficiency (DE):

- Reduce average days in milk
- Provide properly balanced ration
- Improve forage digestibility
- Improve NDF digestibility - 35% and above
- Provide adequate effective fiber
- Stimulate rumen fermentation
- Minimize ration sorting
- Utilize feed and silage additives
- Minimize effects of extreme temperatures
- Closely monitoring fresh cows
- Minimize cow stress
- Maximizing cow longevity
- Giving cows adequate space (48.4 - 59.2 sq. ft./cow)
- Selecting high genetic merit bulls

Forage quality is the most important factor in achieving optimum feed efficiency, and fiber digestibility can be the most significant parameter of improving one’s efficiency range. A one-unit increase in NDF digestibility (NDFd) in vitro or in situ was associated with a 0.37 lb. increase in DMI and a 0.55 lb. increase in 4 percent fat-corrected milk (Oba and Allen, JDS, 1999). Why is this important? Because feed is 50 percent of your costs and forage is 50 percent of your feed.

Forage quality depends on four main components: neutral detergent fiber digestibility (NDFD), fermentation (VFA’s etc.), particle length and the presence of mold, yeast and mycotoxins. Obviously, producing or buying the best possible forages is a goal on every dairy. But upon setting a value on good quality forage and focusing on fiber digestibility, then why do we leave rumen function and it’s impact on digesting this ‘high quality’ forage to chance?

Rumen function is a direct result of the rumen microbial activity by the populations of bacteria that are able to proliferate in the current rumen conditions. Rumen conditions are impacted by, in part, anaerobic stability, pH, and nutrient flow.

The TMR catapulted our feeding programs into the impacts of improved rumen function. Keeping this in mind, there are ways in which we can be attentive to subtle improvements in rumen function by tweaking the theory. For example, highly digestible forages (NDFd) can have maximum impact only if the rumen is functioning properly.
The species of bacteria we want in the rumen are anaerobic; oxygen is toxic to them. Secondly, rumen pH dictates the activity of rumen microbes and just like people, they don’t all agree on what is ideal. The starch digesters like a more acidic or lower pH environment while the fiber digesters prefer a higher pH, specifically over 6.0. This is a constant struggle as our diets determine the acidity of the rumen. You can see how diets heavy in starch will dictate more prolific populations of starch digesters resulting in a more acid rumen. Unfortunately, the fiber digesters find this acidity a hostile environment in which to live and therefore become extremely inefficient when rumen acidity increases. This basic reality in rumen microbiology begins to explain why more and more grain supports the economic theory of diminishing returns.

The use of yeast cultures has long been accepted as a means of stimulating microbial activity. Yea-Sacc® is a good example of a technology that has been shown to positively affect NDFd! (Williams et al., 1991) (Chademana and Ofer, 1990) (Semptey and Devisser, 1992). The mode of action is quite simple. The metabolic activity of the yeast cells in Yea-Sacc® actually alter the rumen environment in favor of fiber digesters. A recent literature review on the mode of action and performance response to Yea-Sacc® concluded that a 10.9% increase in NDFd can be expected. The use of Yea-Sacc® coupled with the best forage management practices become a mathematical equation to improving fiber digestibility and positively impacting milk production. The same literature review also showed Yea-Sacc® predictably increases milk production by 2.04 lbs.

In conclusion, rumen function has a huge impact on feed efficiency and as discussed, we can impact feed efficiency as a component of dairy efficiency with relatively low investment above our current situation. It just takes a different perspective and thought process.