by John Goeser

TMR performance viewed through manure

THERE'S a cliché levied at times to depict someone who may not be overly familiar with dairy cows. It goes something like this, "They don't understand the difference between the front end and the back end of a cow." Discussing the front and back end of the cow in this sense is in poor taste and not helpful. Alternatively, relating the total mixed ration (TMR) in front of the cow to the undigested and excreted manure out the back end can be quite helpful.

Feeding studies determine apparent nutrient digestion using TMR and fecal samples. Sparing you the complex math, ration nutrient disappearance through the cows can be quantified by relating the TMR to the fecal samples. Outside of feeding studies, we've also applied this approach to commercial dairies over the past 15 years and have come away with great insights. With TMR digestibility (TMRD) results in hand, we're often able to work backwards in the ration and find opportunities to improve. In many investigations, the forage or grain feeding potential as projected by the feed analysis isn't being captured, thus nutrient digestion through cows is hampered. This can be due to feed management, feed particle size, or even feed hygiene issues. While concrete, the TMRD approach is costly and can take up to two weeks to get results.

Manure math

Alternatively, Jimmy Ferguson recognized that fecal starch was tightly correlated to total tract starch digestibility (TTSD) in dairy herds. The real benefit to fecal starch analysis is that it is much faster and far less costly than a full blown TMRD assessment. We've since used fecal starch analysis to determine apparent total tract starch digestion with great success in dairy and calf rations. With today's grain processing capabilities and forward thinking management, we're able to get fecal starch results below the 1% goal and achieve roughly 99% TTSD. Every unit increase in fecal starch equates to about 1.25 units less TTSD. With this understanding, we can calculate the wasted corn grain in the diet. For example, if the current fecal starch level is 5%, we can calculate the wasted corn grain by multiplying the ration starch concentration and dry matter intake by the TTSD. In this situation, with 25% starch, there's roughly a pound of wasted corn grain compared to the 1% fecal starch goal. The math adds up quickly, especially when corn prices are high. This also doesn't take into account milk and feed conversion efficiency opportunities rooted in more energy being unlocked with greater TTSD. This continues to be an excellent ration benchmarking tool, and your farm needs to know your number.

Another tool in the toolbox

Though starch is only one piece of the puzzle, we've long sought other fecal analysis tools to offer insights into ration performance. Now thanks to an exhaustive Rock River Laboratory database and collaboration with nutrition experts, we've uncovered a new relationship with fecal fat that can be used in a similar fashion to fecal starch.

While fiber and protein in dairy cow manure don't help project total tract fiber or protein digestion, fat is different. Our data analysis and resulting predictive model found that fat in manure is related to total tract fat digestion (TTFD) — much like starch is related to TTSD. A one unit boost in fecal fat relates to about a 6.5-unit drop in TTFD, and the approach can be applied with dairies feeding rations containing 3% or more total fat. Trust that with high-oleic soybeans exploding on the dairy nutrition scene and expensive fat supplements, the interest in benchmarking and evaluating how fat is performing through the cows has been intense.

Dairy fecal samples realistically range from as low as 2% fat to nearly 5%. This is a smaller range than starch, but the impact is greater per unit. Applying the new TTFD model to these results projects a realistic range of roughly 60% to over 75% total tract fat digestion. I've then taken these database benchmarks and made a pilot effort to assess economic implications. Assuming $1,500 per ton for supplemental fat, 4.5% fat in the ration, and a 56-pound dry matter intake, I've speculated that there might be 15 to 25 cents or more in wasted feed costs by comparing average or poor TTFD to the 75% benchmark. There are numerous assumptions in this projection, so take this discussion up with your nutritionist before you take my word for it.

With more to learn, use it just as you would with fecal starch and monitor it over time. I recommend that dairies add this new manure benchmark to their toolbox for another insight viewed through manure. We can now make another valuable connection between the front and back end of the cow.

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