



by Steve Martin

## Is there a sweet spot for milk urea nitrogen?

MILK urea nitrogen (MUN) data sits at a pretty important table with other milk measurements like percent butterfat (BF), milk protein (MP) and somatic cell count (SCC). All are highly important daily indicators of the milk shipped from a dairy. Not only do BF and MP say a lot about the value of the milk and the forthcoming pay price, they also speak to issues related to breed type, diet formulation, stage of lactation, and rumen health.

Although MUN is often listed in the same report with these items, it doesn't impact the value of the milk. But does it deserve the same respect?

I always like to think of ration formulation and milk production as an exercise in repackaging building blocks. The carbon and nitrogen in BF and MP were once carbon and nitrogen in feed ingredients. The cow is the machine that tears them down and rebuilds them into high quality human food.

With these building blocks there is no gain or loss in the process; they all go somewhere. This is where MUN earns its seat at the table with BF and MP. Though MUN value does not impact milk revenue to the dairy, it does work almost as well as BF and MP in serving as a diagnostic tool to evaluate the diet.

Even so, MUN still feels a little out of step with the others. SCC is very straightforward – the lower the better, and the factors impacting SCC are well understood. When looking at BF and MP, the numbers range widely but the values on a percentage basis are mostly driven by how much water they are carried in and by the cow's feed intake. Low milk flow from Jersey cows or cows on pasture results in higher fat and protein on a percentage basis.

### MUNs can range widely

The other end of the spectrum might be a big Holstein with very high milk flow and thus lower percentages of BF and MP. Both of those results are intuitive, but MUN doesn't really fit into the same

*The author is founder of Dairy Nutrition and Management Consulting LLC, which works with dairies and heifer growers in Texas, New Mexico, Kansas, Colorado and Washington.*

thought process. There is a high and a low end of an acceptable range, but is there a true sweet spot? One thing is for certain: there is a wide range of acceptable results for MUN from a producer's perspective.

Evaluating MUN values in dairy records offers us the opportunity to better evaluate at least two areas of the dairy – the commodity barn, and the rumen. The ingredients we buy to use in rations and how we blend them together can have a big impact on expected MUN results. As well, the way the ration behaves in the cow's rumen is equally important.

Managing MUN values is not an exact science, and one thought I want to emphasize is that MUN results should never be in the driver's seat.

To understand what MUN tells us, we need a quick review of rumen function, nitrogen balance, and general protein nutrition. Just like there is no net gain or loss of carbon in a cow, there is no net gain or loss of nitrogen. No matter whether nitrogen is in a protein meal, corn grain, alfalfa or urea, it all goes somewhere. The goal is to convert as much of it as possible into marketable milk protein.

What MUN really tells us is how well are we feeding the cow to maximize the efficiency of converting feed protein into milk protein. If the range for a normal lactating cow is from 8 to 16, you can say that the lower end of that scale indicates a highly efficient conversion of feed protein to milk protein. But is having a low MUN the goal? Probably not.

Now for a quick lesson about the "U" in MUN. Excessive or ill-timed nitrogen in the rumen that is not converted into high-value microbial protein is simply absorbed across the rumen wall as ammonia. The body tissue then converts it to urea and disposes of it, primarily in urine.

Our true interest is blood urea nitrogen (BUN), which best quantifies this loss of nitrogen, but daily blood samples are not available nor desirable. The reason we use MUN is that we have a convenient sample of milk every day to analyze. The good news is the small amount of this type of nitrogen in milk is directly correlated to urea in the blood.

If you had a very low protein diet,

for example, with a grazing ration that really needs some supplemental protein, you are very likely to have a low MUN – but not necessarily maximum milk production. On the other hand, let's assume that the grazed forage is very high in quality (more than 20 percent protein.) Those cows will likely have a very high MUN, indicating that too much of the protein in the diet is not being converted into salable milk protein.

When the subject of MUN comes up with a client, I often say the lowest MUN values will come when you have the highest milk production. For any number of reasons that milk production is high at a dairy, the conversion of feed nitrogen into milk protein will probably be the most efficient, thus a low MUN.

The times when your MUN will likely be on the high end is when the herd is perhaps long in days in milk or it is milking poorly for other reasons. In such an instance, dietary protein levels can probably go below the comfort level of most nutritionists and producers. The same could be said for a group of late lactation cows that are fed a targeted diet to match their stage of lactation, intake and production.

Most of the MUN analysis, though, will be centered around a herd striving for high milk flow with normal stage-of-lactation dynamics and a variety of feedstuffs available. In this situation, MUN should probably range from 10 to 12. Maybe that could be described as a sweet spot. If the herd is milking very well, the MUN might drift down to 9 and not be a concern, although it may suggest an opportunity for even more milk if a bit more protein was added to the diet.

### Many things affect MUNs

At times we find ourselves working with a client and striving for more milk. Maybe recent reproductive success is leading to lower days in milk, or we are coming into the spring flush. In such a situation it may be advisable to lead-feed a bit to be sure protein in the diet is adequate for the cows that need it, and to be sure that protein is not a limiting factor when production momentum gets going.



While waiting for the increased milk you might be satisfied with a little higher MUN of around 12 to 13.

Over the years, some of our clients have been more comfortable with high MUNs than others. They might say their highest milk flow has come with a 13 MUN, so that is what they want to target. In such cases I probably work for that, but offer caution if we get over 13.

Similarly, if a client is pushing for a 9 MUN it's probably because that's what they remember having when they had their highest production. In that case, if we are working to get back to those desired high milk flow results I remind them that their fond memories of high milk flow were not caused by the 9 MUN. Rather, MUN was 9 because the milk was 90 pounds, not the other way around.

In next month's column I will look into what specific diet dynamics can impact MUN. You may be surprised that it is not just the type and amount of protein included in the diet, but also the nature of the carbohydrates alongside the protein that can also have a big impact on MUN.

There are also issues related to environmental nutrient management and reproduction to be considered. Remember, no one is getting paid for a specific MUN in their milk. But using MUN as a tool to be sure the diet is correctly built to match the production opportunity at a particular dairy will insure that you are feeding for the bottom line. **WEST**