by Steve Martin

Is quality forage the key to high production?

WHEN I moved into my office to start graduate school at Texas A&M, I found a glass beaker on the desk filled with small plastic stars. It took a few days to learn what they were.

The student who had the desk before me had studied rumen function in feedlot cattle. I found out the stars were part of a study comparing traditional roughage sources like hay or cottonseed hulls in feedlot diets, with the plastic stars. The question it asked was, could rumen-scratching low digestibility grass hay and cottonseed hulls be replaced with non-digestible plastic?

Thirty years later it is still an interesting question to ponder.

It was also at this desk where, having grown up with beef cattle, I realized that I knew essentially nothing about dairy cows. Sure, I could use the computer to build an academically sound diet, but that was it.

One of the first things I learned was the great chasm that exists between the beaker of plastic rumen stars and the near-spiritual relationship dairy farmers have with high quality forage.

If you were to take a poll of successful milk producers and ask them what the top five keys are to successful dairy farming, I suspect two items would make every list: cow comfort and quality forage, because comfortable cows that consume high quality forage are well on their way to high milk production.

While different regions of the country may have their favorite go-to forage for dairy rations, there is no doubt that corn silage and alfalfa are the king and queen.

In fact, there are several sectors of agribusiness in which agronomists focus on providing ever-improving genetics for those two feeds, engineers work to improve harvesting and processing, and biochemists concentrate on feed storage. To be sure, the needs of dairy producers are the focus of research and marketing efforts in these companies.

Not as good can still work

Most dairy producers would tell you that their highest milk production comes when they have the highest quality forages. While I am in full agreement with this principle, using some new technology – and thinking about those plastic rumen stars – can we still have high milk production with less than high quality forages?

I think we can.

If I haven't lost every forage quality-focused reader by now, let me be clear about something. When I refer to quality in this discussion, I am not talking about poor versus well fermented silage, or hay that was baled too wet and has moldy spots. I am talking mostly about maturity at harvest and species-related differences in fiber content. An example might be that of comparing 185 relative feed value (RFV) alfalfa hay with a more mature alfalfa hay that might be 130 RFV. We have two sets of tools at our disposal that should allow us to achieve the same milk production with either hay.

In a departure from my usual approach, this is also not an economic discussion. It is purely biology. Depending upon cost and availability of better or worse hay and other ration ingredients, either hay option could be the better economic choice.

Twenty or more years ago it was expected that a producer would say they got the most milk from the best forage. Using the tools we have available in 2016, both mechanical and nutritional, we should be able to get the same production from both good and no-so-good hay.

How is this possible? Let's go back to the plastic stars.

The feedlot animal is a ruminant, so it needs roughage. However, the goals for its life do not have the longevity factor that dominates the value of a milk cow. In the feedlot animals' situation, researchers used information about how much of the diet could be comprised of the stars but still keep them ruminating and healthy – or at least that was the study's goal.

In much the same way, although at a much higher percentage of the diet, a dairy cow needs a certain amount of undigested fiber to keep her in a healthy production status.

Another group of dairy industry professionals that is focused on milk producers are forage analysis labs. Over the past 100 years nutritionists have used these labs and have progressed from crude fiber to acid detergent fiber (ADF) and neutral detergent fiber (NDF), and then to measuring the digestibility of NDF.

In the past few years, instead of focusing only on the digestibility of fiber and its resulting energy value, there has also been an effort to estimate the amount of **undigested** fiber in a given forage.

Nutritionists have always argued about whether dairy cows have a minimum forage requirement, similar to how they have a requirement for individual nutrients like calcium. It seemed no one could agree what that minimum forage number might be. You would find successful diets containing 30 percent forage, while some would say 55 percent is necessary. How could they both be right?

Now we know why, and with this new knowledge I think we have found the nutrient that actually might have a minimum requirement for healthy milk production: undigested NDF (uNDF). It can now be included in your forage analysis package at many labs.

It is likely that a dairy cow has a minimum amount of uNDF that gives the rumen that perfect fill and adequate structure to keep it functioning correctly. If there is a certain quantity of uNDF that needs to be present in a cow's daily intake, how does that relate to 185 RFV versus 130 RFV alfalfa hay?

This is where a good nutrition model helps you build the diet correctly around either hay.

While considering the other forages and by-products included in the diet, it will simply take less of the 130 RFV hay to meet the health requirement of undigested fiber. As an example, it might take 10 pounds of the 185 RFV hay, but when using the 130 RFV hay, you supply the needed fiber in only 7 pounds. The question is what to do with the extra 3 pounds when completing the diet.

I look at those 3 pounds as an opportunity. What does the diet need to support high milk production? Often that space is filled with high-digestibility, often value-priced by-products like beet pulp, soy hulls and other fermentable fiber sources.

Equal by addition

In effect what you are doing is making the lower quality hay and 3 pounds of other ingredients as good as the 10 pounds of better quality hay. Maybe it's with a little protein, a touch of starch or sugar and digestible fiber sources rich in hemicellulose. This is what formulation is about; building a blend that can match exactly the nutrient analysis of the beautiful "milk cow" quality 185 RFV alfalfa hay.

I mentioned two tools to make this process successful. The first one I have discussed related to forage analysis and the subsequent ration formulation. The second tool has more to do with diesel and steel.

We all know that more mature forages can have issues with palatability and intake in TMR feeding systems. To make the formulation magic presented above successful, the higher fiber hay must be processed and presented in a fashion that will insure adequate intake.

Historically, before we could do the math on managing the amount of uNDF in a diet it was fair to say that higher maturity (and thus higher fiber) forages would result in lower intakes and lower production. Using the new math related to uNDF, as long as you process the forage adequately and fill the newly liberated space thoughtfully, there should be equal nutrient delivery and equal intake potential.

I am not suggesting that you stop looking for, or stop growing, high quality forage. But I am saying that by using uNDF we now have tools to make higher-fiber, previously less desirable forages become more useful in lactation rations.

It could be that the higher maturity hay plus some highly digestible by-products might be a lower cost option to support the same milk. Or perhaps the goal of your farm is to not inventory various by-product ingredients and your preference is to grow or buy low maturity and highly digestible forages.

The beauty of this newer approach is that with the correct science in analysis, formulation, processing and mixing, both forage approaches can fit in a system where you are feeding for the bottom line. *WEST*

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