by Steve Martin

Finding the feeding balance

UNLIKE the engineer, architect, and builder standing at a jobsite reviewing building plans, the dairy nutritionist and the dairy owner will never be able to do math on all aspects of their goals. In math, two plus two always equals four. This is a big help to the engineer! When feeding dairy cows, it would appear that at times, two plus two equals five, while at other times, two plus two only equals three.


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In the situation of the engineer, architect, and builder, the plans are decided, the work is done, and the building is completed. The process of building dairy rations for even one herd is a job that is never done. A long list of farm changes including ingredients and weather requires building and rebuilding.

There are at least two more factors that might necessitate diet reformulation. The first of these is economics. With changes in prices of inputs and values of outputs, the approach of a ration may need to change to enhance income for the farm. The other reason is cow performance.

Adjusting for performance

The volume of information collected from dairy cows is impressive, and still we are adding newer measures from emerging technology. With this frequent and abundant data, there are many opportunities to evaluate performance. If goals are not being met, one of the likely solutions will be related to adjusting the ration formulation.

Looking back to the situation with the engineer, architect, and builder, if there is a resulting problem with the building, the mistake at the root of the problem likely will have a definable mathematic explanation. Working in a biological situation like feeding dairy cows, there are just too many variables that could be the cause of the lack of performance. Perhaps having some understanding of these variables based on experience might be the best way to really describe the part of feeding cows that we call "art."

As a college student, I had a higher than average interest in ration formulation systems. Due to taking two classes out of order, I actually learned how to formulate rations with a computer program before learning to do them by hand. After a few more classes to better understand the biology behind all of the mathematics, I could successfully formulate least-cost rations using linear programming. But my practical knowledge of feeding cows had been limited to making simple ground hay, protein, and mineral mixes at the local co-op for our beef herd on pasture.

My "welcome to the real world" experience happened in Stephenville, Texas, as a young nutritionist. I could not make the formulation software agree with the actual feed inputs and milk outputs for rations that I was evaluating. Over time, I began to learn about the many potential variables that caused my confusion. These unknowns are simply not considered in an academic ration, but they should be for an actual diet being fed on a real dairy. Thus, I was introduced to the art of feeding dairy cows.

There was one more thing to learn as well. To get the real ration being fed, it took a bit of digging to be sure things like moisture levels, forage quality, and actual intakes were fully understood. There are two principles that are always true and have helped guide me since those early years — cows don't make milk out of air and the nutrients in the feed they actually consume have to go somewhere.

Real-world benefits

The most important difference from the academic ration to one that is actually being fed to cows is the ability to have the feedback of the performance of cows consuming the ration. In class, you can get an A+ on a ration that meets the required nutrients and would appear otherwise workable if put into a real-world situation.

With every diet I build today for real animals at real farms, there will be frequent and credible production results to verify the success of the ration. This is why dairy nutritionists, probably at a greater degree than any other species group of nutritionists, must be good at collecting, summarizing, and interpreting performance data. At the minimum, a milk tank will be measured with a graduated stick, and the resulting grade for the nutritionist may or may not be the A+ received for the correct ration in class.

Comes down to teamwork

Another skill a good dairy nutritionist needs to acquire is how to defend a ration without becoming defensive. If we are doing our job correctly, and we have all of the information needed on forages and ingredients, we should be able to defend the ration as formulated on paper as a "good" ration. The extra work may come when trying to figure out why the good ration isn't having good results.

It could be that we don't know as much about the ingredients as we thought. At times, these are moving targets, and it's an effort to truly keep up. Or, perhaps feeding errors, loading order, sorting, or many of the other speed bumps along the way are preventing the good results predicted by the model.

Working with dairy clients and employees is the way to be sure that the ration built for success actually meets that goal. For sure, it needs to be formulated correctly to begin with, but following the implementation all the way to the bunk is the way to win.

Perhaps the art of feeding cows is not only in the court of the formulator, but also in the hands of the team at the farm that puts the ration into motion. It is my job to be sure we know as much about what we have to feed, and then, be sure all of the math is right. In doing this, I will add some art (or experience) in the mix to ensure the math can be successful. Then, my partners at the dairy make the magic happen in ration implementation.

The final steps may be my on-farm review of the process, visual inspection of the cows, and finally a full assessment of production records. It is a team effort driven by science, math, art, and most importantly, people who care about cows.

The author is the founder of DNMCmilk, which works with dairy producers and heifer growers in multiple Western states.