



by Steve Martin

Today's milk was yesterday's feed

WHEN we hear the word “factory” in the same breath with the word “farm”, many of us in agriculture immediately become defensive. Those who wish to disparage large farming operations have described them as “factory farms”.

Those of us close enough to know the truth are fully aware that most of them, although they may be large, are almost always family owned and have excellent animal care and respect for the environment.

What about another use for the word factory, and this time specifically on a dairy farm? Most would connect the word factory with a place that is involved in manufacturing something; a place where raw materials are brought in, assembled, crafted and transformed into a sellable product. In a real sense, this is exactly what a dairy cow does, although in the biological realm.

All classes of livestock turn raw materials into salable, nutritious products. However, dairy cows and laying hens are unique in that they do it on a daily basis. In this constant process it is easy to connect inputs consumed with outputs that are ready for sale.

Milk fat and protein in the bulk tank today were literally sitting in the commodity barn yesterday. How should this reality, and the comparison to a factory, impact the way we think about how we feed dairy cows?

I spend a lot of time talking with clients about the production results of their cows. While doing so I try to steer conversation to the building blocks we give to cows. At times we forget about those and overly focus on the finished salable products that are produced from them, but we see most clearly when we correctly consider both sides.

In middle school science, students learn about the first law of thermodynamics: energy can be transformed from one form to another, but cannot be created or destroyed. I often refer to this to make a point.

There is no disappearance of, nor creation of, any material between the commodity barn and the bulk tank. There can be a complete accounting if one takes the time and leans on a few fact-based assumptions. Feed matter does not simply vanish, nor do milk solids magically appear.

The first fuzziness to clear up is water. There may be no more important factor in any biological system, but the problem with water is it always confuses the math!

Must account for water

I remember sitting in a Feeds and Feeding class in college and watching truly smart students never fully comprehend dry matter versus as-fed conversions with feed ingredients. Similarly, I get questions from very talented dairy producers about doing this math on wet ingredients like silages to be sure they get the dollars right. Do I divide or multiply? is usually the question. It is a difficult concept.

With good-natured humor, those of us in the dairy world might presume ourselves generally brighter than our counterparts in the beef world. “Those guys still talk about things on an as-fed basis, how backward” we might say. We could also brag that while we often struggle with the math, at least we’ve been talking about feeds on a 100 percent dry matter basis for 20 years.

While we have been correct in removing the variable amounts of water contained in common feed ingredients, our industry is still mostly “old-school” in the way it thinks about water in milk.

Talking about raw pounds of milk produced is as inexact as talking about pounds of as-fed intake. Because of this way of thinking, we have started looking at feed conversion with a new twist. Yes, there have long been corrections made by using calculations to arrive at energy-corrected milk, but when thinking about true conversions and economics, does that tell the whole story?

Removing all of the water from the feed side, and then removing all of the water from the milk side, will offer the best angle from which to consider how efficiently a cow is converting nutrients in dry feed into milk solids.

You also can’t have this discussion without talking about carbon and nitrogen. The carbons in starch, fiber, fat and sugars in feed will be the same exact carbons that comprise the carbons in butterfat, lactose and the carbon backbones of milk protein. Nitrogen molecules that result in the protein level on your hay analysis and other ingredients are the same nitrogen molecules that comprise the protein in milk.

None of them were created; they were in the mixer wagon yesterday. Increasing the throughput while maintaining or even improving efficiency is where the economic game is won on dairies.

Like a bank account

A cow is like a bank account that is a checking/savings combo. Each month you put money in, and you also take money out for things you need. Along the way there may be some fees charged that reduce your balance, but those funds didn’t simply vanish, they just got redirected out of your wealth control. When you put more money in than you take out, your account balance grows. When you take more out than you put in, your account balance shrinks.

This is a pretty apt picture of a dairy cow. In early lactation, inputs will not keep pace with outputs and the account balance – her body weight – declines. In later lactation, a slowing level of production and a constant level of intake begins to replenish earlier losses and her body weight increases.

The point is, things come in and out on an ongoing basis and the balance is either perfectly maintained or is in a gaining or declining mode.

In the real dairy world milk solids, not water, drive the way our clients are paid. They sell pounds

of butterfat, protein and other solids, not water. We relate the actual results of how much of each they have to sell directly back to the way we formulated their rations. The dollars related to each will tell the story of net income, margin, or income over feed cost. Taking the water out of both sides of the equation makes the results more clear.

Less intake, lower tests

This approach helped recently as I discussed a summertime loss of production with a client. With our background in the southern U.S., we know well the results of heat stress. In this herd, milk production was over 80 pounds with only average components on a percentage basis.

As summer began to bear down, the cows’ intake dropped significantly as expected. Much to the concern of the dairyman, butterfat and protein tests went from average to rather low. After visually inspecting the health of the cows, cud chewing, manure health, etc. it was determined that although the butterfat was lower than ideal, the cows were healthy. So why the low solids percentages?

I suggested we do some math equations on a piece of paper and see if there was clue. I took the higher spring production and average component levels and related them to the higher intakes in the cooler weather. I looked at the ratio of how many pounds of dry milk solids were produced per day and how many pounds of dry feed it took to make them. When I did the same math for heat-stressed cows with lower intakes, the efficiency of the herd converting feed to milk was nearly the same!

In a moderate to severe heat stress environment, those cows converted at a rate that was only three percent less than the more comfortable springtime cows. The reason why their milk was down some, and why their components were down even more from a percentage standpoint, was explained by a big reduction in feed intake and an ever so slight reduction in efficiency.

We know that early lactation cows convert a little better than later lactation cows, and we know that carbon loss into manure is higher in diets with poor quality forages. But in a set of cows that are well fed and at normal days in milk, the conversion of feed into milk solids output is pretty predictable.

If a diet is reasonably well balanced and a cow is not on either extreme of days in milk, we can say with a great degree of accuracy what her efficiency of converting feed to milk will be. In many cases, the goal is to increase intake so that more building blocks “go in the front door”.

I should point out that this description is an over-simplification of a multifaceted and very complicated set of biological processes. However, for a dairy producer, thinking about the cow as a converter of feed to milk and working hard to be sure that she gets bred on time, is housed comfortably, and is offered a balanced ration will insure that they are truly feeding for the bottom line.