Achieving optimum TMR moisture (part 2)

by Steve Martin

IN THE November issue I discussed the importance of moisture levels in dairy rations. Just as we are all aware of the important roles that moisture and dry matter play in managing wet forages and by-products, the same concept is equally important in the final ration presented to animals.

It can seem unlikely that the amount of water in a cow's diet is really so important. After all, cows can graze lush forage that is as much as 85 percent water and only 15 percent dry matter (DM), and do great. While at other times of year they can do great eating a hay-based diet that is the exact opposite. How, then, could managing the moisture/DM level in a total mixed ration in the bunk be that important?

Last month I mentioned a recent research trial where higher levels of moisture in a dairy diet seemed to enhance overall appetite, and also resulted in less ration sorting. Both concepts would not surprise any dairy producer or nutritionist. We all know what a perfect ration looks and feels like and, for sure, moisture content is a big part of that consideration.

In many cases, ration moisture/DM levels of around 50 percent seem to be the goal. TMRs in that range seem to handle the best, have the best bunk life, and tend to result in minimal sorting. It also seems that many diets we normally feed that include some silage and a wet by-product or two end up in this range.

The questions seem to come when this 50:50 blend is not so easy to achieve. Maybe it is when dry hay is the most economical forage to feed and the feeding area is not equipped with an easy way to add water. In such a case, if you look at a TMR in the bunk that is as dry as 75:25 (DM:water) you will quickly see potential issues. Finding ways to get water into these diets is critical.

Don't add too much

The other extreme can also be of concern. Suppose the dairy wants to use as much corn silage as possible and the least-cost grain product happens to be wet. In that instance if you aren't careful you can end up with a bunk mix that looks like slop. Corrections there will also pay dividends in cow performance.

The question remains, "How wet is too wet?" Let's discuss the dry extreme first.

In diets where hay is plentiful and wet by-products or silage are nowhere close, the answer usually involves a plumbing project. However, we do find farms that don't have water in the feeding area. In those situations one must decide how far is too far to drive the mixer to get to usable water, and at what point does the cost of digging lines and installing pumps and tanks become reasonable.

Data and experience will tell us that nearly any effort required to add water to a mixer is justified. If you do go to the trouble to lay pipe and install the other necessary components, make sure the flow rate is adequate to add the needed water in just a few minutes. Excessive time using a low-flow water source may increase the risk of over-mixing, short particle length, and poor cow health.

The reality is that if a mixer contains 15,000 pounds of air-dry ingredients and your goal is an approximate 50:50 moisture level, then you have to nearly double the weight of the mixer load with water. The reality is that using small pipes and slow pumps will typically not get the job done fast enough.

How much is enough?

The far more interesting question to ponder is, "How wet is too wet?" This is a common question among dairy farms, since silage feeding rates are on the rise, and quite often the least expensive sources of supplemental energy and protein are wet by-products. These ingredients may be 60 to 70 percent water and can add significant moisture to the bunk.

An even wetter ingredient we often use is whey. When you see liquid whey coming out of a PVC pipe and it looks pretty much like water, it is hard to believe it is actually about 30 percent DM. Not only does whey add a significant amount of moisture to the mix, it also adds a little "sticky" to the particles because it is high in lactose. Molasses and similar molasses blends would probably fit into this group, but they are much dryer than most whey.

I mentioned the concept last month about how various ways of adding moisture to rations "share" the actual water with dry ingredients in the mix. The two extremes here would be water and silage.

If you simply add water from a pipe into the mixer, it has the opportunity to hydrate any and all of the dry ingredients in the ration. Adding corn silage, however, that is as much as 65 to 70 percent moisture doesn't do a good job of hydrating other particles. Silage is wet, but it doesn't "share" its moisture very well with dry hay or other dry ingredients.

Once again, whey is the surprise here. We feed whey products that are dried; some arrive at the dairy at around 30 percent DM, which is not very different from the wetter end of many silages. A few pounds of dry matter from whey can really change the "wet feel" of a ration, while the same amount of dry matter from silage barely moves the needle. Yet on paper they would add very close to the same amount of moisture.

In most cases, one would think that the value proposition for various ingredients would be considered on only a dry matter basis. After all, we are attempting to value the energy, protein and fiber that are in a particular ingredient, and how it compares to supplying those same nutrients from other sources.

Moisture and feed value

But in some cases the moisture level of an ingredient actually does impact its value in a particular ration.

For example, if a heifer ration has the option of using whey, wet distillers, wet brewers, and a dry ingredient like dried distillers, we can use a computer model to find out which one brings the most real nutritive value to the diet while not making the final TMR too wet.

Some may say 40 percent DM is low-end for a heifer ration. I am sure there are successful heifer rations that are wetter than that, but in some areas and with some ingredients, producers like to stay out of the 30s for DM percentage. So how do we decide which wet ingredient is best to use?

Using the linear program in a good model, a nutritionist can search for the solution that results in the lowest cost while not exceeding maximum bunk moisture desired by the client.

In this example, the value of dried versus wet distillers would be different depending upon whether the diet in use is a high silage or high dry hay ration. If very low-cost whey was also available, reaching but not exceeding the maximum bunk moisture will have an even larger impact on the value of wet versus dry distillers.

Thinking about both as-fed and dry matter percentages and feed rates is a big part of real-world dairy nutrition. Frequent testing using either professional forage labs or on-farm testing is a must to make sure the math and the solutions are correct.

In general, rations are built on a 100 percent DM basis, but they are always fed on an as-fed basis. We are thankful for good on-farm feeding software choices to handle this math with ease. The math is easy, but the concepts are not always straightforward or intuitive.

Taking the time to understand these moisture concepts, and working to be sure that the math is correct, will insure that no matter whether you are talking as-fed or DM basis, the cows will be fed right. In doing so, you will insure that you are feeding for the bottom line.