by Steve Martin

Percentages or amounts?

BEFORE the rest of my family made the switch to Apple computers, I served as the information technology guy in our house.

Life seemed more simple when we all lived in peace together using Windows computers. In those days any inquiry about how to accomplish something was met with a first suggestion of, "right-click and see if the option you need is in that list". Just like rebooting solved many computer performance problems, the right-click menu in nearly all Windows-based software gave you most of the options or tools you needed.

Rick-click is wonderful! It's like a handy drawer of tools waiting patiently to help. Sure, Apple has the two-finger tap, but it's not the same.

There is also a very important right-click function inside my ration building software. Among other tools and options, its right-click menu has the ability to toggle the nutrient content of the on-screen ration between **amounts** of nutrients and **ratios or percentages** of nutrients. It's a great tool and it brings up an age-old question when feeding animals.

In discussions about rations and cow performance, we have all been reminded – usually by someone of an older generation – that cows eat amounts of things, not percentages like on your ration sheet. What the well-meaning challenger is saying is that the amount of intake of an ingredient, not just percentage, is very important and should be considered when building diets.

Ration has its root in the Latin word ratio. An 1859 dictionary I found online defines ration as an "apportion of fixed amounts." It sounds like the dairy nutrition use of "ration" is more true to the root meaning than many other uses of the word.

My discussion here, though, describes the tension between building a TMR that has everything at the correct ratio (and thus nutrient content), versus one that has a certain gross amount of an individual ingredient or nutrient before moving on to build the rest of the diet.

Office theory versus feeder reality

This may seem like more of a philosophical discussion or nit-picking, but it's really not. That's because there are real differences to feeding cows when you're a nutritionist sitting at a computer, or a dairy manager using an on-farm software tool, or a feeder in the seat of a loader.

It is also not a discussion that can be resolved in a magazine column. Suffice it to say, the application of this principle impacts the way we manage nutrition on a dairy.

I often get asked about adding or removing straw in a ration. At the risk of probably over thinking this one I usually say, "let me do it in the computer." Why? Because if we simply add or remove amounts of anything, even very small amounts, the ratios of all the nutrients adjust accordingly. This is likely not problematic, but eases over into the area of what I call "nutrient drift."

It's easy enough to keep it all correct, so why not go the extra step? Sure, if the fresh cows are loose and experience tells you that adding one-half pound of grass hay fixes the problem, it is a good move to quickly add it on top of the current ration, or literally top-dress it on top of the TMR.

You have fixed the reason for the loose manure and at the same time slightly reduced the percentage or ratio of everything in the diet except for roughage and fiber. The cow has been well served by the quick response, but the next ration adjustment needs to include this move and rebalance the details. Adding that step prevents nutrient drift.

Much of this discussion has to do with micro-nutrients in the diet. In the nutrition guidelines we use, some nutrients are expressed in amount fashion, like grams, and others are expressed in a ratio fashion, like percentage, parts per million (ppm), etc. In these ratios you even see the odd combination of metric units and conventional units mixed together in a way that would probably shock my fifth grade math teacher. I don't remember seeing the fraction mg/lb on any of my worksheets.

Here is an example of this tension at work in many dairies:

I asked a client recently to guess which animals on his farm were receiving the least amount of vitamins and trace minerals. He was surprised when I told him it was the fresh cow pen. Wouldn't it be better if it were late lactation or far off dry cows rather than transitioning fresh cows? That is often the case, given the way most dairies feed mineral/vitamin packages, and the problem is selenium.

There are rules about how much selenium can be fed to farm animals and they are, unfortunately, in the form of a ratio. The dairy limit is 0.30 ppm selenium, whether it is fresh cows eating 35 pounds of dry matter or high producers eating 60 pounds. So if the amount of selenium needed by a cow is the same whether she is eating 35 pounds or 60 pounds, regulators have made it impossible to supply the same amount in these two ration situations.

Since selenium is a trace mineral related to immunity that works with Vitamin E to keep cows healthy, I might suggest that just-fresh cows have as much or more metabolic and immunity risk than high producing cows consuming at the top of their intake curve. If I stay inside the regulations I can't offer both groups the same amount of selenium due to their drastically different intakes.

Vitamins and other trace minerals are more flexible. There are a number of ways I can offer the correct amount of vitamins to lower-intake fresh cows. To do so we need a different delivery mechanism to supply extra amounts of just vitamins and trace minerals other than selenium.

There is a similar issue related to Rumensin. The FDA range of 11 to 22 grams per ton of dry matter intake is for sure the craziest unit description ever, but at least it offers us a range of allowable Rumensin levels to offer flexibility for variable dry matter intake.

What about a more tangible nutrient requirement that every dairy producer has a feeling for: roughage? Does a cow have a minimum requirement for roughage or forage, and if so is it in a percentage of the diet or is it in raw pounds?

We can look at old-style component feeding or maybe grazing to illustrate this. We would all agree that there is a minimum amount of forage a dairy cow needs to stay healthy, and once this level has been achieved, her additional intake can be of higher energy, grain-type ingredients to support milk production.

If you translate this principle over to a TMR feeding approach, your lower intake fresh cow diets should have a higher percentage of forage to accomplish that minimum amount of roughage in their lower intakes. Most formulators follow this principle – but maybe not to the full extent to keep the roughage intake the same.

Even more challenging is roughage level for cows experiencing severe heat stress.

In such cases we often reduce the bulk a little to encourage extra intake by these hot cows. The previous principle, though, would suggest the opposite response. If cows have a minimum requirement for volume of roughage, then when intakes go down shouldn't forage levels go up? It's a challenging question.

So, there can be significant differences in how we feed cows in various life stages based upon the issue of feeding amounts of things versus percentages of things. The result is frequent use of the right-click button in my ration software. It probably comes down to which nutrient you are dialing in as to which fits the best. Some are driven by regulations, some by nutrient delivery goals, and some by good cow sense.

Push for more or keep it simple?

Inherent in this conversation is the age-old question regarding one-group TMRs compared to targeted feeding. If you feed multiple rations, how important is it to have each one balanced for the actual intake of each specific group?

The answer to that question, and probably most of the other questions posed here, depends upon whether you have the ability to address the uniqueness of each group's needs by having multiple mineral, vitamin and additive ingredients available on the farm.

If you want to keep things simple and keep just one source of blended micro ingredients in inventory, you will need to you will need to accept some compromises and feed a ration that is based upon percentages and ratios.

No matter whether you balance the fresh cow diet at 35 pounds or feed them the high cow diet that is balanced at 50 pounds, if they have the same vitamin/mineral ingredient added they will both be at 0.30 ppm. In such a case, the fresh cows will get a lesser quantity of all the goodies, additives, vitamins, trace minerals, etc.

If you are willing to complicate your feeding program a bit and have some additional ingredients on the farm, you can likely target the needs of the different groups of cows better.

The correct answer to these questions is likely dependent upon the particular situation.

If a dairy decides to keep things simple and have a higher likelihood of good feeding compliance, that may be best for them.

If another dairy thinks the next rung in the production ladder is to add some complications in the feeding program to better target nutrients to what the different classes of cows need, and they can pull it off successfully, that is also a good option. I might add that in this approach there would be opportunities for feed cost savings to dial back some costly nutrients supplied to later lactation cows.

The losing decision is to be excited about the possibilities of better meeting various cows' nutrient demands, but poorly executing the complications of this approach that are necessary. Finding the correct and comfortable spot for your dairy will insure that you are feeding for the bottom line. *WEST*

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