



by Steve Martin

## CP was then, MP is now

FOR much of the last 100 years, the most common measure of feed ingredient quality has been crude protein (CP). Feed companies and farmers alike use it to state the feed value of their products. It is a term that virtually all dairy producers understand, as well as the idea that higher CP is usually more valuable.

This yardstick has served the animal feeding industry well, but in recent years a new measurement allows nutritionists to better predict the way ruminant animals utilize protein. It is called metabolizable protein (MP).

Swine and poultry feeders moved away from CP some years ago, as they had the option to meet their animals' protein requirements by feeding the actual amino acids in CP. It's not that dairy and beef ration formulators aren't also interested in those amino acids, it's just that rumen fermentation complicates the math.

The answer to that has been to develop models to predict MP, and then compare it to the animals' needs for MP to make milk and meat. As a result, MP has become the protein nutrient of choice by most dairy nutritionists today.

### Conflicting terms

But MP has been a more difficult concept to bring into dairymen's vocabularies than CP was. In fact, the learning curve has been a little complicated due to the fact there are two other MP acronyms being used.

The first one offers the most opportunity for confusion, because "microbial protein" is sometimes also abbreviated as MP – and it comprises the largest portion of metabolizable protein. Confusing indeed.

The second one stands for milk protein. Consequently, the production of milk protein in the dairy cow is closely related to both of the other MPs. We have three things that can all be abbreviated as MP and they are all connected in the process of taking CP in the feed and converting it to milk protein to sell.

In recent years, milk protein has been a key driver in milk pricing. Since it is tied so closely to dairy profitability, it is a concept that should be



understood by all dairy producers.

In the dairy world, feed and forage analysis is big business. I suspect more feed ingredients are tested in labs to build dairy rations than all others combined. When forage growers or milk producers look at a feed analysis, one of the first things they check on the summary sheet is CP. It is basically an expression of the amount of nitrogen in a feed or forage, and it involves a simple analytical procedure that can be completed on any material.

Metabolizable protein, however, will not be found on a feed report. Unlike CP, it is not something that can be analyzed in the lab.

MP is an expression of the result of a particular diet in a particular animal. The goal of MP is to express the amount of usable protein that leaves the rumen, usually in grams per day or grams per unit of intake. It is a value for the whole diet, not what each ingredient brings to the ration to be averaged together. It is the end result of how much protein exits the rumen to be used by the animal.

MP is derived primarily from a variable ratio of two components: feed protein that bypasses rumen degradation, and microbial protein. It is these nitrogen building blocks that cows use to either maintain their own body protein, or more importantly, make valuable milk

protein. You can say that MP is the useful result of the complicated microbiological teamwork that goes on in the rumen.

It is important to understand how CP and MP differ. The most unlikely fact is that energy in the diet has a significant impact on the grams of MP that are produced. Starch, which is the primary energy source in most dairy rations, is a big factor in driving MP in diets.

### Microbial protein is key

The part of MP that is often called bypass protein can be estimated by lab analysis, but the microbial protein portion is derived from microbiology in the rumen. That fermentation process is fueled by feed protein and carbohydrates in the ration, from which microbes grow as a result. The microbial mass that results is very rich in high quality protein.

How does all of this impact feeds found in dairy rations? In general, some ingredients tend to help formulators increase MP predictions in dairy diets more than others. There are times when an ingredient may look great from the standpoint of protein content and cost per ton, but not so much in its potential fit into a particular diet to increase MP.

This makes for some interesting banter between ingredient buyers and nutritionists. Many have used

Excel files to build dollars per pound of CP value calculators, but in the new era of MP those cheat sheets don't always give the right answer.

One of the best examples is the friendly competition between dried distillers grains (DDG) and corn gluten feed. Many dairies think these two corn by-products are similar enough to only use one, but in reality they are not very similar and have quite different impacts on MP milk support. It just depends on the diet.

DDG has much less rumen available protein than gluten, even though DDG has more crude protein (30 versus 20). If you have a diet where rumen degradable protein is moderate and starch is high, the highly degradable protein in gluten will result in higher MP.

DDG often has a real challenge in making a significant contribution to MP. Lower rumen availability of protein in DDG, along with poor amino acid balance of the bypass portion, limits its ability to have a big impact on MP. In many cases, DDG value in the ration comes from its energy contribution, not protein.

The protein characteristics of forages in a diet also need to be considered. Forages like alfalfa haylage and high quality small grain silages are rich in soluble protein. Matching the correct by-product protein source to complement forage protein will maximize MP. Monitoring milk protein yield and milk urea nitrogen (MUN) levels will serve as a good measure of protein formulation success.

The take home message is that while CP has lost its seat at the head ration formulation table, it isn't out of the picture entirely. It can still be used for quick feed value determinations when buying, or perhaps for harvest time considerations.

But the newer and more valuable MP approach needs to be used for ration formulation, since it allows the nutritionist to correctly match the protein side of a diet with the carbohydrate portion to convert as much feed protein and energy as possible into making milk protein. In doing so it will maximize milk income and by doing so, a formulator can correctly feed for the bottom line. **WEST**