

Straight to the Bottom Line

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Title- How does feeding more metabolizable protein impact your milk check?

Last month in this column, we discussed the reasons why metabolizable protein (MP) has replaced crude protein (CP) as the measure of choice in dairy rations. As MP continues to increase in importance, dairy producers should gain a general understanding of what impacts MP. This nutrient is challenging to grasp because it is not a traditional nutrient that can be measured in a feed ingredient and reported in a feed analysis. Instead, MP is expressed in grams that exit the rumen to be used as the building blocks for milk protein. This action that is the normal result of fermentation in all ruminants can be manipulated via diet formulation. So, understanding what factors can enhance the MP of a diet is helpful for dairy producers.

Since CP has dominated the discussion in recent decades, we should start there and learn how CP impacts MP. The nitrogen that is in MP is in the form of amino acids that the animal needs. This nitrogen could have been measured as CP in the diet. In the rumen however, microbial action transforms this CP and reinvents most of it in the form of microbial protein. This protein is actually the body mass of these tiny bugs and is perfect for the animal to convert to milk. Microbial protein is the major contributor to MP. The rest of the MP is from feed protein that was not impacted by the microbes and passes out of the rumen untouched. This is commonly referred to as bypass protein. So, one way to increase MP is to feed more bypass protein. Though effective, this is not the best approach in most cases.

The most effective way to increase MP is to enhance the efficiency of the microbial protein production in the rumen. Understanding the different ways to do this might improve the understanding of some newer ideas in ration formulation. Let's focus on two of the important principles that are common drivers in rations. The first of these is how starch fits in the equation and the second is the value difference between byproducts like DDG and Gluten compared to higher quality proteins like SBM and Canola.

These nutrition discussions frequently find their way back to starch. That is the case here as well. So, corn at \$8 versus \$5 per bushel matters in enhancing MP. It is not intuitive, but starch in the ration will increase the MP of the diet. Starch is an energy nutrient for sure, but increasing starch levels in a diet will increase MP. Since the majority of MP is from microbial protein, things that enhance rumen fermentation will improve MP. As long as the diet is below a concerning level of starch, adding starch will increase the microbial activity in the rumen and the result will be more microbial protein produced. So, higher starch diets will have higher MP results, and this is only loosely related to the CP level in the diet. To be sure, nitrogen in the rumen is needed for the microbes to replicate and build body mass, but starch is the fuel for the engine.

Secondly, all CP levels are not created equal as it relates to improving the MP of a diet. This is where the common corn byproduct ingredients like Gluten and DDG are not very effective in increasing the MP prediction of the diet. Frequently, DDG or gluten will be cheaper on a crude protein value basis, but when considered in a model that is based on MP, have less value. DDG in particular struggles to enhance the MP of the diet because its protein is less soluble and not available to coordinate with the starch and build microbial protein and thus MP. Gluten often brings a little more value due to its upper teens starch percent and a more soluble protein contribution. SBM and canola are much more effective at enhancing MP partly due to their better amino acid balance for the portion of their protein that is bypass.

Remember that all ingredients have a certain level of bypass so the amino acid quality is important and impacts MP. Corn byproducts like DDG and Gluten do not have amino acid content to help the diet.

Thus, oilseed meals almost always have a place. Forage proteins are variable but have to be sampled and modeled due to high variation. They mostly contribute to rumen available protein and work with carbohydrates like starch to build microbial protein. There are significant advances in plant genetics coming soon that will help forage protein be more effective in adding to MP.

The well-known group of bypass proteins including bypass SBM, blood meal, fish meal and even synthetic bypass amino acids are clear drivers of MP. These all have a more relevant amino acid contribution and add significantly to MP. The best philosophy though is to maximize the microbial protein production in the rumen by feeding adequate levels of starch and well-timed rumen degradable protein. Once this has been maximized, adding some bypass proteins will top off your ration MP and support a few more pounds of milk.

Even though MP is not something we can measure in a stack of hay or a pile of silage, it along with energy is a main driver in ration formulation. By knowing a few things that enhance MP in a diet, you might understand why the corn sometimes needs better processing and why the DDG though it seems really cheap, may not be the best deal. As well, you might be a little quicker to agree to the extra cost of a pinch of blood meal from time to time. Remember, milk protein pays the bills for most dairy producers, so be respectful of the MP in your diet. The nitrogen in that milk protein was once an amino acid in CP in a feed you bought or grew. Then, the rumen transformed much of it and sent it to the small intestine as MP for absorption. Once absorbed, the tissue of this amazing animal works more magic to convert that nitrogen into a sellable product. So, maximizing MP through your ration will increase the amount of milk protein you sell and thus improve your milk income! Cheese anyone?