



## Let's look at amino acid balancing

by Essi Evans

WE TEND to think that cows have a protein requirement and, frequently, diets are balanced to a specific crude protein level: 16 percent, 17 percent and so forth. In reality, cows have no specific requirement for protein; instead, they require amino acids, the building blocks of protein.

Laboratories provide numbers for the crude protein in ration ingredients but do not often supply information on the amino acid profile of those ingredients. The reason we put so much emphasis on the crude protein levels of ingredients is because it allows us to calculate amino acid levels, which are most often calculated as percentages of the true protein in the various ingredients. If the amount of amino acids supplied meets cows' requirements, then the diet is "balanced" for amino acids.

Formulating rations based on amino acid balancing has the potential to elevate milk component production, improve protein utilization and lessen cows' environmental impact. Since protein ingredients are

more expensive than grains and forages, there is also potential to save money through amino acid balancing.

### Old hat for other species

Although fairly new to the dairy industry, amino acid balancing has been utilized by poultry and swine nutritionists for decades. By balancing diets for amino acids, nutritionists have found they can often meet animal requirements with much lower levels of crude protein. Ration formulators can then judiciously select the individual amino acids that these animals require.

Before moving forward with balancing for amino acids, the dairy feeding industry needs to first account for the effects of the rumen in ration-balancing schemes. This knowledge is allowing our industry to catch up to the poultry and swine industries in this regard.

Balancing dairy rations for amino acids can improve milk and component yield, although this may vary from farm to farm, based on a variety of factors. When balancing for overall protein, you take a gamble as to whether you have supplied the cow with her requirements for

essential amino acids. If you under-supply the cow's requirements, you risk losing out on performance.

The table shows results from five recent studies conducted in Minnesota, in which diets were reformulated to balance for amino acids. The only changes were in the proteins used to balance the diets. The forage and grain portion of the rations remained consistent across all trials. When the protein sources were lowered, the grain was elevated. Results varied, depending on how "unbalanced" the

rations were to begin with. In some of the herds, the improvement in milk yield and component yield was very high, but it was more modest in other herds.

### Lower protein, reduce waste

Only about 30 percent of the crude protein a cow consumes is converted to milk protein. Wasted crude protein is converted to urea and ammonia, and these compounds are excreted in manure and urine. Regulations dictate the amount of ammonia that can be emitted to the atmosphere from all sources, including agriculture. Ultimately, this influences nutrient management at the farm level.

There are two ways to improve protein efficiency and lessen waste: improve milk protein yield or reduce ration protein. As the table shows, amino acid balancing can result in as much as a 12 percent improvement in milk protein yield. Furthermore, research shows that ration crude protein can often be reduced by 0.5 to 2 percent when diets are being balanced for amino acids. This translates into significantly less protein lost into the environment and higher returns for dairy producers. 🐄

Results of amino acid balancing in five Minnesota herds\*

Trial No.	Diet	Milk, lbs.	Milkfat, lbs.	Milk protein lbs.
1	Control	86.8	3.23	2.74
	Test	90.3	3.33	3.02
2	Control	95.4	2.87	2.44
	Test	101.3	2.94	2.49
3	Control	82.2	3.30	2.84
	Test	82.2	3.49	3.01
4	Control	65.8	2.88	2.35
	Test	73.4	3.57	2.64
5	Control	83.4	3.25	2.58
	Test	87.3	2.90	2.61

\*Evans, Patterson and Sniffen. Feedstuffs, April 10, 2012.

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