

Balance amino acids for more milk protein

Since multiple component pricing was implemented, producers have asked: How can I increase milk protein?

By Tom Overton

The usual answer is to increase milk protein yield and maintain breed average components. The major reason: Milk protein percentage is more constant among herds than is milk fat percentage. And there is little opportunity to increase milk protein percentage substantially without decreasing milk yield.

Recent research indicates another option. Balancing amino acids may provide opportunities to increase milk protein percentage by 0.1 to 0.2 percent while maintaining or increasing milk yield.

During the past few years, systems to balance dairy rations for amino acids have been developed as an extension of the metabolizable protein systems. Given that the 20 amino acids in nature are the building blocks of proteins, and cows require protein in order to get the amino acids that make up that protein, these systems are important.

Two systems, among several developed to balance diets for amino acids, account for the fact that milk protein, rumen microbial protein and body tissue have characteristic, and relatively constant, amino acid profiles.

1. Factorial. This system, which is present within the Cornell Net Carbohydrate and Protein System (CNCPS) and CPM Dairy, sums the requirements for each amino acid for maintenance, growth, pregnancy and lactation, primarily milk protein yield. It then compares this requirement with the predicted supply of each amino acid from rumen microbial protein and rumen escape (bypass) protein sources.

2. Ideal protein system. The 2001 Dairy National Research Council (NRC) committee adopted this system, which is also present in CNCPS and CPM Dairy. It has been applied to swine and poultry for many years and relies on expressing amino acids in proportions to one another.

Dr. Henri Rulquin at INRA in France and Dr. Chuck Schwab from the University of New Hampshire adapted the "ideal" protein system to dairy for the two commonly limiting amino acids – methionine (Met) and lysine (Lys) – for milk protein production.

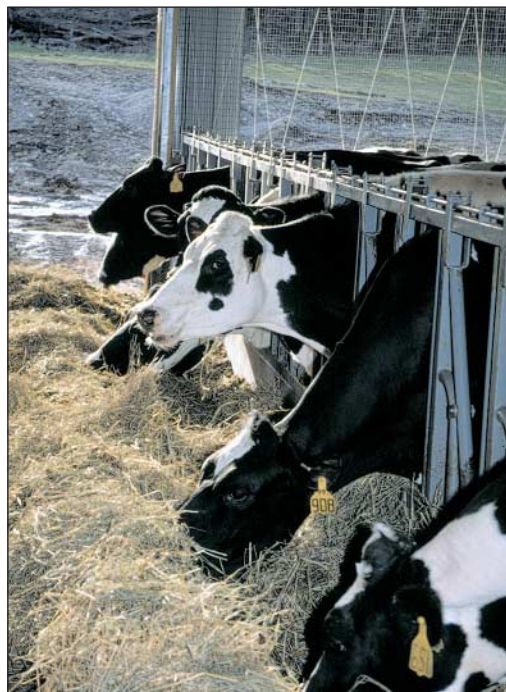
In experiments, they increased the supplies of Met and Lys then measured the response of milk protein yield. Typical increases in milk protein yield when supplies of these two amino acids were increased ranged from 50 to 100 grams per day.

The NRC system expresses Met and Lys as a percentage of predicted metabolizable protein supply. (See goals for Met and Lys in list below.)

Bottom line strategy

To balance amino acids and maximize milk component output:

- Maximize dry matter intake.
- Balance carbohydrate and protein supply in the rumen to maximize rumen microbial protein supply. Rumen bugs, which have an outstanding amino acid profile compared to milk protein, are the lowest cost source of amino acids.
- Maintain sufficient physically effective neutral detergent fiber (NDF) to keep ruminants healthy.
- Add lysine to result in 6.8 percent of metabolizable protein supply by supplementing sources higher in Lys, such as blood meal and "bypass" soybean meals. Lys supply must be adequate for cows to respond to Met.
- Add Met to result in 2.2 percent of metabolizable protein supply by supplementing sources higher in it such as corn gluten meal, fishmeal, and synthetic rumen-protected sources of either Met or an analog of Met. ■



The ideal protein system has been adapted to dairy for two commonly limiting amino acids – methionine and lysine.

FYI

- Tom Overton is an assistant professor in Cornell University's Department of Animal Science.
- To access the 2001 Dairy NRC, see http://www7.nationalacademies.org/banr/BANR_Dairy_Cattle.html