

# Negative protein balance and transition cows

Kip Karges for *Progressive Dairyman*

The management of the transition dairy cow is often one of the more challenging times during the entire lactation cycle. If not properly managed, this phase can either set the cow up for success throughout the rest of the lactation cycle, or it could result in challenges in sustaining her genetic potential for production levels – especially in the latter phases of the lactation cycle.

It is common working knowledge that the nutrition during this critical phase of the transition cow is closely monitored by nutritionists and herd managers to avoid many nutrition-related challenges that occur if cows slip into a negative energy balance. The consequences of negative energy balances and fat reserves being mobilized have been and continue to be hot topics in the dairy nutrition circle. On the other hand, it is seldom you hear people discuss the effects of

a negative protein balance and the subsequent effects on the lactation production cycle.

Today's genetics in dairy cows continue to improve at light-speed. Due to this rapid development, we find nutritional demands and requirements are often challenged to keep up with the genetic potential in dairy cows. With today's genetic potential, it is becoming increasingly difficult to get enough calories into the cow to optimize milk production, especially during the transition phase where nutrient requirements are at their highest. Calories are viewed as coming from fiber, fat and grain sources, whereas protein is viewed as a means to supply critical types of proteins such as degradable and bypass proteins.

During transition, protein

requirements are extremely high, presenting a tough challenge to meet this protein requirement. By feeding cows supplemental protein, we are able to bridge these protein deficiencies, thereby hopefully meeting the elevated requirements for protein. But when a cow driven by her genetic potential, especially during the transition phase, develops a negative protein balance (meaning her requirements are greater than what is being supplied), it is very difficult to play catch-up and meet these protein requirements. If not addressed, her body condition reserves will be used to help offset this need for critical proteins, which ultimately can affect milk production level.

Metabolizable protein (MP),

which can be further broken down into rumen-degradable and bypass proteins, is a measurement used by many nutritionists today to determine if cows are being supplied adequate levels of these types of proteins for proper rumen function and other metabolic functions, i.e., milk production. Rumen-degradable protein is required by the rumen microbes for further production of microbes and for proper rumen digestion.

Once rumen microbes die, they can then be used by the cow as a source of amino acids (AAs) that flow into the small intestine of the cow to be digested and absorbed –

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## Negative protein balance and transition cows, cont'd from front

Mother Nature's way of supplying AAs to the cow. Microbial protein can supply roughly 50 percent of AAs to cows, with only a small percent of this being credited to supplying the total absorbed AAs being supplied to the cow. So this "AA gap" needs to be bridged through all phases of the lactation cycle but especially during the transition phase in the form of MP supplementation or rumen-protected AAs.

Methionine and lysine have long been identified as the two most limiting AAs for most feeding situations in dairy cows. These AAs are relatively low in concentration – not only in feed ingredient sources, but also low concentrations are observed in rumen microbial protein, making diet formulation difficult at best to meet the requirements for these two essential limiting AAs. To compensate for this additional supplementation in the diet through particular feed ingredients or rumen-protected AAs, provide the cow with needed levels of these critical essential AAs that serve to drive milk production and components.

It is important to point out cows have requirements for particular essential AAs, i.e., lysine and methionine, which when deficient have been proven to have a larger impact on decreasing milk production as compared to when sufficient MP levels are in the diet. This emphasizes the importance of understanding the nutritional profile of ingredients and subsequent effects they have on milk production, as the efficiency of MP is directly related to the AA composition of that particular ingredient.

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transitioning a cow – when protein requirements are maxed out – it becomes a challenge for today's nutritionists to hit their targets for MP and essential AAs, i.e., lysine and methionine. However, with the aid of rumen-protected AA technology, there are several options on the market today for owners, general managers, nutritionists and herd managers. These high-tech precision ingredients provide dairy producers today with a means of addressing negative protein issues which, if left unaddressed, can have

production and components.

In terms of ration formulation regarding AA balancing for cows in the transition phase, there are some general thoughts that should be evaluated and periodically reviewed with your nutritionist. Some of these principles are not just limited to the transition cow but could easily have applicability in other areas of ration management as well, so being open-minded is a good thing.

**1** Feed the bugs in the rumen first and foremost. This is done with rumen-degradable

production and milk components are going to be achieved during periods when negative protein balances exist or there is a need for these precision ingredients to optimize production performance of the cow. It is important when feeding these precision nutrients to know the bypass and digestibility of these AAs so accurate supplementation of these AAs can occur.

**4** Oftentimes, it is possible to lower the crude protein levels in a ration when balancing for AAs. It also may be feasible to re-evaluate levels of rumen-undegradable protein that is being formulated for when the use of rumen-protected AAs are being utilized in the diet.

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ramifications that will carry over into the subsequent phases of the lactation cycle.

Given this, with today's economic climate in the production of milk, it becomes very important to manage a nutrition program in phases to ensure each phase of ration formulation is being optimized. If day-to-day logistics of the dairy do not allow for this level of nutritional management, then one possible option is to use these rumen-protected AAs for a certain period of time across the entire herd, given that one milking ration is being used across all classes of cows. As the industry moves toward considerable progress in the area of ration formulation, models have allowed us to balance for certain nutrients at a very sophisticated level. Balancing these high-tech precision ingredients as well as the internal management component within an operation can ensure these ingredients can translate into higher milk

protein sources that, in turn, will meet requirements for microbial growth for AA and ammonia production. By comparing formulated levels of RDP relative to cow performance, one can often prevent having too little RDP in the diet, as this can cause a decrease in digestion, which has negative effects on milk production.

**2** Optimize rumen health by feeding a TMR that offers enough effective fiber that, when combined with the correct type of fermentable grains, will drive rumen fermentation, thus optimizing microbial protein synthesis. This is important in terms of supplying as much microbial protein to the small intestine as possible, thus potentially decreasing the amount of supplemental protein.

**3** Supplementation with rumen-protected AAs, i.e., lysine and methionine, is important if optimal milk

The bottom line is: We all realize there are several advantages of addressing the energy needs of a transition cow. But just as important and oftentimes overlooked are the protein needs, and more specifically the AA needs of the transition cow. It is important to understand that AA requirements today, not crude protein, are very strategic ingredients that will enhance ration formulation, providing better nutrition that will help in optimizing health, breeding and profitability.

With today's genetic potential, it is extremely challenging at times to achieve optimal production, as we are limited by our ability to navigate and match the nutritional needs with genetic ability. The use of rumen-protected AA precision nutrients allow nutritionists today to address MP and AA challenges in rations, thereby allowing the opportunity for improvement in milk performance and components, which ultimately increases revenue being generated by the dairy. **PD**

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