

Amino acid balancing can improve your milk check

Even when milk prices are low, it's good to look at whether attempts to boost components will pay.

by Chuck Schwab

INTEREST in balancing rations for amino acids continues to grow. Nutritionists are discovering that balancing rations to also meet the dietary requirements for the first two limiting amino acids is good business regardless of milk prices.

Amino acids serve as the building blocks for tissue and milk proteins. Essential amino acids are obtained from metabolizable protein . . . primarily ruminally synthesized bacteria and rumen undegraded feed protein (RUP). However, limiting amino acids, notably methionine and lysine, may not be available in RUP in the amounts needed. Inadequate supplies can limit protein production which may impact performance.

What we've learned . . .

Research in amino acids has been conducted since the 1960s with on-farm experience reinforcing research results. It is believed that, when amino acids are supplied in the correct balance and amounts as required by the dairy cow:

- Feed nitrogen is converted to milk protein more efficiently.
- Milk and milk protein yields will be higher.
- More efficient protein synthesis occurs.
- The requirement for total absorbed amino acids is minimized.
- The need for supplemental RUP to meet methionine and lysine requirements decreases.
- More space exists in the ration for other required nutrients.
- Less nitrogen is excreted into the environment as there is minimal catabolism of "left-over" amino acid.
- Herd margins can improve.

In addition, it has been suggested that, when rations are properly balanced for the first two limiting amino acids, methionine and lysine, additional benefits may be realized. Ample supplies of these amino acids may help diminish the risk of metabolic disorders, influence reproductive performance, affect immune function, and lessen fat infiltration of the liver. Fat infiltration predisposes cows to fatty liver and ketosis.

Your formulation approach . . .

At your dairy, lay the groundwork for amino acid balancing by consistently feeding the same or similar rations that are well balanced especially for fermentable carbohydrates. This supports good rumen health and maximizes microbial protein synthesis. Make your primary sources of fermentable carbohydrates high-quality forages and finely ground or steam-flaked cereal grains.

This will maximize microbial protein production as microbial protein has a superior amino acid profile to rumen undegradable protein (RUP). With higher microbial protein production, you need to feed less RUP.

Next, balance for methionine and lysine. This is accomplished by eliminating or reducing low-lysine feeds and replacing them with high-lysine protein supplements such as fish meal, soybean meal, and canola meal along with a protected methionine product.

We find that this two-step ration-balancing process allows cows to really respond and that we can feed less bypass protein. Rations containing just 16 to 16.5 percent protein are re-

placing rations with 18.5 percent protein. The other 2 percentage units are being filled with more fermentable carbohydrates as milk is produced from fermentable carbohydrates.

On the farm, three different strategies can be used to enhance the cow's nutrition and your returns. Each strategy assumes top-notch herd care is in place as amino acid balancing should be used to advance good management, not cover up for poor management.

Good practices include feeding good-quality forage, providing a good water supply, having good bunk management, and offering a consistent diet feeding to feeding, one that is balanced for nonstructural carbohydrates (NSC), neutral detergent fiber (NDF), rumen degradable protein (RDP), RUP, minerals, and vitamins.

Scenario 1. If both the herd's milk volume and components are disappointing, maintain the current metabolizable protein (MP) concentration in the ration, improve lysine and methionine to the maximum practical target levels and ensure a rumen available hydroxymethyl butanoic acid (HMB) concentration of 0.10 percent to support milk yield and components. While feed costs may go up by 20 to 40 cents per cow per day, the potential improvement in income over feed cost (IOFC) can be as much as 40 cents to \$1 per cow per day as shown in the table.


	Scenario 1 Change volume and components	Scenario 2 Change components	Scenario 3 Enhance rations- same cost
Milk yield, lbs.	+4 to 8	+0 to 2	+0 to 1
Milk protein, %	+0.1 to 0.3	+0.1 to 0.3	< +0.1
Milkfat, %	+0.1 to 0.4	+0.1 to 0.4	< +0.1
Feed costs cents/day	+20 to 40	+5 to 20	0
IOFC - cents/ cow/day	+40 to 100	+20 to 60	+10 to 20

Scenario 2. If your herd produces an adequate milk yield but components are disappointing and dietary protein inputs are high, formulate to meet the target levels of lysine and methionine. Incorporate HMB to allow MP (RUP) levels in the ration to be lowered. This will improve the overall efficiency of the use of MP. You should maintain milk yield and see a positive change in components.

Scenario 3. If you want to feed an "enhanced" ration at no additional cost, moderately improve the levels of lysine and methionine by reformulating the ration. This provides positive support for the percent milk protein.

What to expect . . .

Balancing for lysine and methionine supports a positive affect on milk protein percent in the days immediately following the ration change. Within a month, you should see the full effects on milkfat percent.

If the cows remain on a balanced amino acid ration program, the new level of milk protein percent typically becomes more pronounced over time. Changes in milk protein percent serve as the most readily apparent indicator of a successful change. Nevertheless, the economic advantage is determined primarily by the changes in milk protein and fat yield. Therefore, effects on milk volume are important, too. The largest milk volume responses have been observed in early lactation and were related to the degree of improvement in the lysine supply. 

Better components, better health

"The number one reason we started feeding a ration that would lead to higher components was, of course, our bottom line," says Rudi DeWinkle, at Moo-Riah Dairy, Melba, Idaho.

In 2003, the dairy's Jerseys were at about 63 pounds of milk sold per cow per day with 3.6 percent protein and 4.6 percent butterfat. All eligible milking cows received BST and were milked 3x with the fresh cows milked six times a day. A 40-day shortened dry period was used.

Today, the herd is at about 58 pounds of milk sold per cow per day with 4.0 percent protein and 5.2 percent butterfat. Now only about half the milking cows receive BST.

"If I started with full BST tomorrow, across the herd, they'd come up another 5 pounds which would put us right back where we were on fluid milk," says DeWinkle. "We lost some milk when we started upping the forage level in the ration, but we soon started gaining components."

The ration contains nearly 10 percent more forage than two years ago. It is more than 50 percent forage on a dry matter basis.

"Meeting the herd's amino acid requirements helps us get high components," says DeWinkle. "If you meet the amino acid requirements and you keep the right ratio of lysine to methionine, you're going to have higher milk protein. I'm convinced of that after the last couple years."

"All the milking cows get a blood-meal-based animal protein blend. It is balanced for their amino acid requirements with rumen-protected methionine providing methionine for the cow and HMB (a methionine hydroxy analog) providing methionine for the rumen. We did a lot of feed trials and early on we could see a substantial increase in butterfat and protein when feeding it. Then for a full year we put the whole herd on this product for two months and then off for two months. We were really able to monitor results in component values. It pays."

Ration formulation affects protein levels and percent butterfat. However, butterfat percentage can be a very good indicator of forage quality and overall rumen health, according to DeWinkle. "It can be hard to increase it," he says. "Many of the ration changes you implement to increase butterfat can hurt your fluid milk flow."

Cows are healthier . . .

Overall, he finds that the cows are healthier now with better feet and longer lived. The death loss has dropped, and the cull rate is down around 22 percent. The average age of the herd's milking cows is 50 months. "We currently have a lot of first-calf heifers," says DeWinkle. "We're in a growth mode."

"I expect the number of older cows to increase now that the cows are a little more rumen healthy," says DeWinkle. "I think they're going to last longer. But Jerseys tend to last pretty long anyway. If you keep their rumen healthy, then their feet tend to last longer, as well."

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