

THE VALUE OF AMINO ACID BALANCING DURING LOW MILK PROTEIN PRICES

In 2014 the price of butterfat averaged \$2.38/lb and protein averaged \$3.79/lb in marketing orders based on components. At these component prices, amino acid balancing routinely resulted in a 2:1 to 3:1 return on investment due to increased milk volume and milk protein and fat content and yield. Supplemental methionine and lysine are often targeted in diets for dairy cows since they are commonly the first limiting amino acids for dairy cows fed typical Northeastern or Midwestern diets predominately containing corn and soy. Amino acids are required nutrients in the same way that minerals and vitamins are required nutrients. All amino acids are used for protein synthesis and each have a multitude of other biological functions. Increased milk protein content is the quickest and most visible benefit to dairy producers when deficient amino acids are supplemented. The increase in milk protein content often ranges from 0.05 to 0.2 %-units and a 0.15 %-unit increase is common.

More recently the price butterfat and protein has inverted. As of December 2015, the price of butterfat averaged \$3.18/lb and protein averaged \$1.32/lb in the Northeast milk marketing order. This price inversion has caused many producers and their nutritionists to question the value of amino acid balancing for dairy cows. Certainly, as milk prices continue to remain low with no short term end in sight, dairy producers must evaluate all dietary supplements or additives. All supplements or additives must provide consistent and scientifically proven results that are worth their cost so that the farm remains profitable in the long term.

For decades the research focus on amino acid supplementation and balancing was

its role in promoting increased milk yield and protein and fat content and yield. Recently there's been a shift in measuring the benefits beyond milk production. In addition to production measurements, researchers are also focusing on the role of functional amino acids and the benefits of amino acid balancing on other biology such as the immune system, oxidative stress, and liver function.

Researchers at the University of Illinois found that transition cows supplemented with methionine consumed more dry matter and produced more milk and milk components. In addition to greater milk yield, those cows also had reduced inflammation, lower oxidative stress, and improved liver function all according to gene expression and blood metabolite measurements. Based on these results it appears that the immune system of cows was dysfunctional when fed methionine-deficient diets, causing depressed appetites. Whereas, immune function improved in transition cows supplemented with methionine resulting in greater appetite, increased dry matter intake, and a concomitant increase in milk yield. Cows supplemented with methionine also had fewer incidences of ketosis. All of these factors indicate that cows are healthier when fed diets that supply the required amount of key essential amino acids.

It can be difficult to quantify the cost of immune dysfunction, increased oxidative stress, or reduced liver function. However, greater progress has been made to accurately quantify the cost of metabolic diseases, particularly around transition. In example, the average cost per case of ketosis is \$289 for all cows according to researchers in the College of Veterinary Medicine

at Cornell University. Proper amino acid balancing has been shown to reduce the incidences of ketosis and should therefore result in greater return on investment. The primary value of amino acid balancing is healthier cows. Furthermore, at a modest increase of 1.0 lb of milk and 0.1 %-units of milk protein or fat content, the return on investment of amino acid balancing simply from the increased value of milk will be approximately 1:1. Amino acid balancing is paying for itself and works as an added bonus beyond healthier cows. The 1:1 return on investment also does not account for any realized savings from replacing more expensive protein feeds with less expensive forages or fermentable carbohydrates since diets are now properly balanced for amino acids.

Proper amino acid balancing continues to be a viable dietary feeding strategy, even during low milk prices. Amino acid balancing consistently results in improved milk yield and component content and yield. Additionally, now there is data that supports the role of amino acid balancing in improved immune and liver function and reduced oxidative stress. So what is the value of amino acid balancing during low milk prices? We're just beginning to quantify the true long-term value, but it certainly appears to be healthier cows.

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