



Lifetime performance improves when feeding rumen-protected methionine

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Extensive research over the last three decades shows that feeding supplemental, encapsulated methionine increases the lifetime performance of dairy cows with the benefits first seen in milk, milk protein and milk fat production. By precisely balancing amino acid levels in the ration, nutritionists can economise the total protein level fed.

Methionine is an essential amino acid and nutrient and typically is the first limiting amino acid in today's dairy rations. Dairy cows cannot synthesise methionine in the quantity required for milk production, health and reproduction, and feedstuffs cannot totally fill the nutritional requirement even when protein is overfed. The unique biochemical role of methionine has led to it being dubbed the enabler of all protein synthesis. It is heavily involved in a multitude of key metabolic and immune pathways.

Longer-term health benefits

Rumen-protected methionine was introduced during the 1990s to support

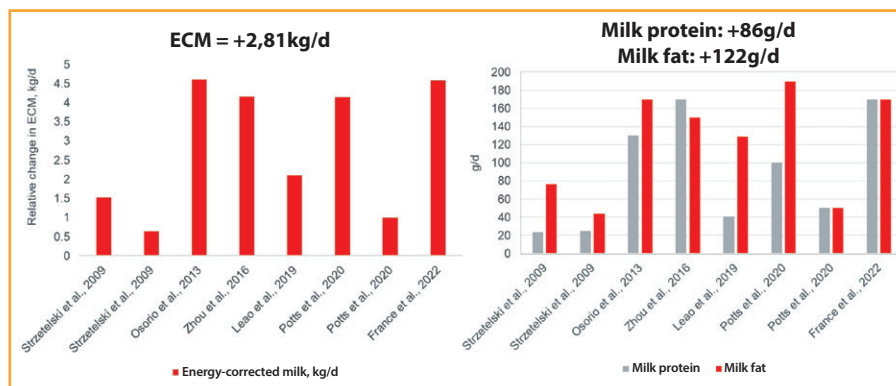
increases in production. In 2001, the National Research Council (NRC) in its publication *Nutrient Requirements of Dairy Cattle* concluded that methionine was one of the most limiting amino acids in dairy diets. More recently, the National Academies of Sciences, Engineering and Medicine (NASEM) released its *2021 Nutrient Requirements of Dairy Cattle*.

In between these two, multiple research groups recognised methionine's longer-

term health and reproduction benefits, and advancements in ration formulation software enabled better optimisation and balancing of amino acids. Today's software delivers least-cost, non-linear solutions. Nutritionists can cost-effectively focus on providing individual amino acids to meet requirements rather than overfeeding protein.

Different universities have researched the functional role of methionine

Figure 1: Effect on milk performance when supplementary RP-Met are provided during the transition period.



beyond protein synthesis over the last two decades. Their research has spurred trials to investigate methionine supplementation from the transition period through the entire lactation period. These trials help define the extent to which amino acid balancing improves lifetime performance.

Advantages of methionine

During the transition period, dairy cows experience the most health issues. Early trials at the University of New Hampshire suggested that methionine supplementation during the transition period improved milk production, sparking interest in understanding more about the role of methionine at transition.

Trials followed at the University of Illinois, Cornell University and University of Wisconsin. Across these studies, increases in dry matter intake, milk yield, milk fat and protein have been reported

with methionine supplementation during the transition period.

Such improvements in production were linked to the effects of methionine on metabolism and immune responses. Specifically, methionine derivatives have antioxidant properties. Cows fed the rumen-protected methionine source have higher antioxidant status (glutathione) and better immune (oxidative burst) and liver function, which prepares them to withstand the transition period and results in higher dry matter intake for healthier cows with increased milk production and composition.

By setting the cow up right in the transition period, enriching diets with methionine bears dividends throughout lactation. Gains in energy-corrected milk generated prior to peak lactation will hold through the rest of lactation. As milk yields decline in later lactation, the gain in component yield will be seen as a further increase in milk component percentage.

Continuing into lactation, amino acid balancing maintains elevated levels of energy-corrected milk and minimises embryonic deaths. Ration protein levels can also be reduced strategically to avoid overfeeding of protein and excess nitrogen excretion. During the last third of lactation, amino acid balancing allows the feeding of very low protein rations to continue maximising nitrogen efficiency and maintaining milk performance.

Balancing the essential amino acid levels in dairy rations now has been well-proven as an effective nutritional tool at all stages of lactation.

Since the beginning of amino acid research, many trials conducted under controlled conditions have expanded on the role of methionine as an essential amino acid and functional nutrient with benefits throughout the entire lactation of dairy cows, underscoring the positive benefits of amino acid balancing on lifetime performance. ❖

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