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A Bluestar Company

New Research Highlights the Essential Nutrient Role of Methionine in Dairy, Plus Mycotoxin Deactivation, and Sodium Butyrate for Post-Weaned Heifers

12 Total Trials Sponsored by Adisseo

As presented at:

ADSA® 2021 Virtual Annual Meeting
July 11–14

4 DAYS	MORE THAN 2000 ATTENDEES	MORE THAN 50 COUNTRIES REPRESENTED

Research that explores the benefits of amino acid nutrition for ruminants continues to receive significant interest. Some 90 new abstracts related to amino acid and protein nutrition were presented during the American Dairy Science Association (ADSA) virtual annual meeting. Of these, 10 were sponsored by Adisseo. In addition, research on mycotoxin deactivation and sodium butyrate were sponsored by Adisseo. The 2021 virtual meeting, reportedly the most comprehensive dairy science meeting in the world, attracted more than 2,000 attendees from more than 50 countries.

"The essential nutrient methionine fulfills wide-ranging roles in dairy nutrition. Its full impact on production, health, and reproductive performance continues to be explored," said Brian Sloan, Global Director of Ruminant Amino Acids and Protected Nutrient Business, Adisseo.

"At the farm level, supplemental methionine offers gains in the production of milk, milk fat, and milk protein. Longer-term, it positively affects health and reproductive performance. It directly contributes to nitrogen use efficiency and cow longevity, i.e., the likelihood that an individual cow remains in the herd."

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Heat Stress

ILLINOIS

Two abstracts from the **University of Illinois** evaluated the impact of methionine supplementation on liver energy and methionine metabolism during heat stress in lactating dairy cows. Providing methionine modulated liver protein abundance and enzyme activity, allowing metabolism to remain stable and making cows less susceptible to metabolic disruptions caused by heat stress.

Further, researchers at the University of Illinois also investigated the effects of rumen protected methionine on the immunometabolic status of the uterus by feeding methionine from 21 d before calving through 73 d post-calving.

Abundance of mRNA in inflammatory and metabolic pathways were favorably altered, indicating a beneficial effect of methionine on immune responses and metabolism during the challenging transition period and early lactation, favoring a uterine environment for successful breeding.

Amino Acid Bioavailability

University of New Hampshire

Researchers from the **University of New Hampshire** presented two studies that involved evaluating the precision and accuracy of the plasma free-amino acid dose-response method. The first study measured the relative methionine bioavailability of Smartamine® M compared to Kessent™ M. The results showed the relative bioavailability of Met in Kessent M vs Smartamine M was 86.0% with an excellent precision of ± 3.0%.

Likewise in a second study, comparing Smartamine® ML vs LysiGEM™, it was revealed the lysine bioavailability of LysiGem was 8.6% relative to Smartamine ML with another excellent precision of ± 3.4%. These studies confirm the plasma free amino acid method as the reference methodology to ensure a very accurate and precise evaluation of protected AA products.

Mycotoxin Deactivation

University of New Hampshire

A third UNH study investigated the effects of the mycotoxin deactivator UNIKE® Plus on rumen parameters in cows fed mycotoxin-contaminated dried distillers grains. While mycotoxin impaired rumen volatile fatty acid production and the microbial population, these parameters were restored by the mycotoxin deactivator, resulting in a healthier rumen.

Na Butyrate & Monensin

University of New Hampshire

In a fourth UNH study, researchers compared the effects of supplementing sodium butyrate, monensin, or both to post-weaned heifers. The addition of either additive conferred positive effects in terms of greater dry matter intake, body weights and lower coccidia oocysts compared to the use of no additive.

Total Amino Acids vs Essential Amino Acids Supplementation

AARHUS UNIVERSITY

Two presentations from **Aarhus University in Denmark** evaluated the effects of an additional supply of total amino acids or only essential amino acids via abomasal infusions during the early postpartum period (d 1 to 35 of lactation).

Providing total amino acids improved milk yields (+8.6 kg/d), energy corrected milk (+5.97 kg/d) and protein yields (+242 g/d) compared to providing only essential amino acids during the first 50 days in milk.

This was associated with an increase in arterial total non essential amino acids and a decrease in total essential amino acids when all amino acids were infused.

These results point to the importance of the supply of certain non essential amino acids for maximizing early postpartum milk production and protein synthesis.

To maximize milk yields and components at the start of lactation, two factors are important: Optimize a supply of essential AAs with a profile similar to casein through ration formulation with diverse protein sources and protected amino acids, and ensure an adequate supply of certain non essential amino acids.

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^{15}N as Nitrogen Efficiency Biomarker

Researchers at **INRAE** explored the use of ^{15}N as a biomarker to predict nitrogen use efficiency in the peripartum period. Results suggested that ^{15}N may have limited applicability as a biomarker during periods where cows mobilize body reserves.

Small Ruminants

Universitat Autònoma de Barcelona

Two studies were conducted to investigate amino acid requirements in sheep at the **Universitat Autónoma de Barcelona**. The first study found that supplementation of rumen protected methionine to high and low crude protein diets (14.8 and 16.6%) in Lacaune dairy ewes during early lactation did not alter intakes, milk yield or milk protein.

Increasing crude protein also did not improve performance, but an excess metabolizable protein supply could explain why there was no milk protein response in methionine balanced diets.

The second study found that methionine supplementation at 2.5 and 2.7% of metabolizable methionine/PDI to dairy ewes increased milk protein content compared to control with 1.8%. Supplementing at 2.5% increased milk protein content the most, suggesting that the dietary metabolizable methionine recommendation of 2.5% in dairy cows may be extended to dairy ewes.

Amino Acids and Low-Forage Diets

A study at the **University of California-Davis** evaluated the effects of feeding rumen protected methionine and lysine to cows on low-forage diets (28% forage). Supplemental amino acids did not alter milk fat and protein but had beneficial effects on milk yield and mammary health, increasing yields by +0.6 kg/d and decreasing risk of mastitis (0.39 times lower).

Methionine and Metabolizable Energy

Research at **Universidade Federal do Paraná** in Brazil confirmed that in full lactation cows producing 50kgs/day, feeding Smartamine M to reach target metabolizable levels, not only improved milk protein but also milk fat % (4.13 vs 3.87) independently of the metabolizable energy level of the diet.

The increase in milk fat was mediated through an increase in preformed and monounsaturated fatty acids while decreasing polyunsaturated fatty acids. Further analysis is ongoing to better understand the mechanism of action of methionine on milk fat synthesis.