



2021

## How to reduce heat stress's impact with another layer of defense

When summer heat and humidity peak, production levels for dairy cows drop to seasonal lows. However, a new means of further limiting the impact of heat stress is by focusing attention on essential nutrients, according to Dr. Brian Sloan, Global Director of the Adisseo Ruminant Amino Acids and Protected Nutrient Business.

Research at Nanjing Agricultural University in China showed that cows challenged to temperatures up to 36°C (96.8°F) displayed blood biomarker levels typical of heat stress. Providing methionine, typically the first limiting amino acid in rations, to balance ration amino acid levels stabilized the heat stress biomarkers. This suggests that balancing rations by adding methionine helps counteract heat stress.

### Biomarker levels of animals under heat stress conditions supplemented with MetaSmart® Dry

Biomarker	Control 0*	Treatment 1 13*	Treatment 2 30*
Alkaline Phosphotase (ALP)	54 <sup>a</sup>	61 <sup>b</sup>	61 <sup>b</sup>
Phosphokinase (CPK)	170 <sup>a</sup>	113 <sup>b</sup>	112 <sup>b</sup>
Glutathione Peroxidase (GSH-Px)	139 <sup>a</sup>	149 <sup>b</sup>	148 <sup>b</sup>
Super Oxide Dismustase (SOD)	137 <sup>a</sup>	153 <sup>b</sup>	154 <sup>b</sup>
Heat Stress Protein (HSP 70)	18 <sup>a</sup>	25 <sup>b</sup>	26 <sup>b</sup>
Thyroid Hormone T3	1.9 <sup>a</sup>	2.6 <sup>b</sup>	2.7 <sup>b</sup>
Thyroid Hormone T4	91 <sup>a</sup>	118 <sup>b</sup>	118 <sup>b</sup>
Cortisol	4.3 <sup>a</sup>	6.4 <sup>b</sup>	6.4 <sup>b</sup>

\*g MetaSmart®

Note: Numbers in the same row with different superscript are significantly different

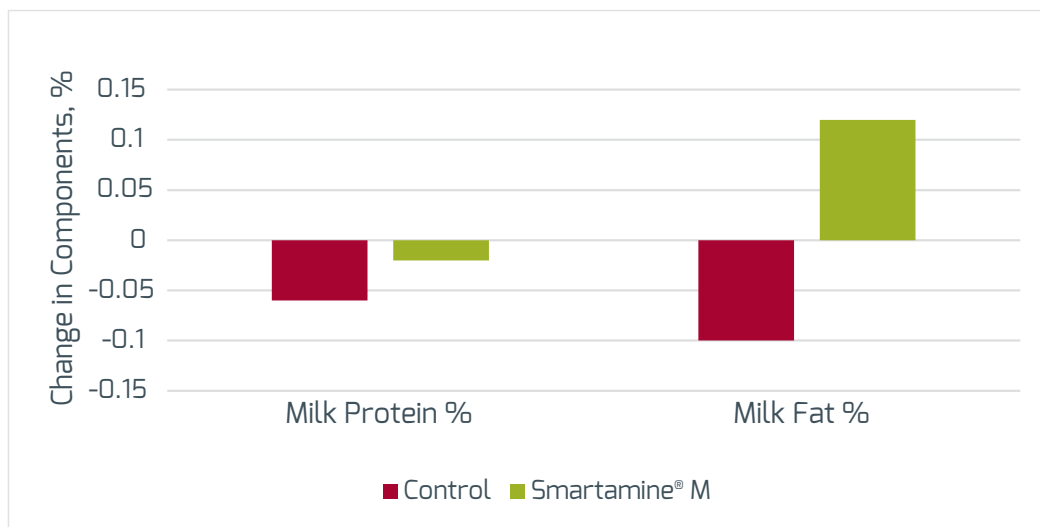
P-Value is 0.001 for each biomarker

Han et al., 2009



Research at the University of Illinois looked at the effect of heat stress on lactation performance when fed with or without supplemental methionine. Heat stress had a significant negative effect on milk protein and milk fat content, whereas supplemental methionine mitigated the negative effect on milk production and increased milk fat.

### Change in Component Concentration ± Supplemental Methionine during a heat stress challenge



Further research into the role of methionine as a functional nutrient at the University of Illinois showed how fully meeting the methionine needs of lactating cows mitigates the impact of heat stress. Additional methionine provides dairy cows with the capacity to modulate mRNA abundance making the cows more resilient to heat stress's impact.

Methionine is an essential nutrient that is best known for its effect on yields of milk, protein, and fat during lactation. Its impacts on health and reproduction pre- and post-calving have been established more recently. Ongoing research will further explore the interconnections between meeting dairy cow methionine requirements and the cow's ability to perform at her best during heat stress.

