

Exploring the Alfalfa Proteome for Optimizing Amino Acid Nutrition

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Amino acid nutrition in dairy cattle diets is one of the challenges to meeting dairy production goals for human health, nutrition, and food security. Alfalfa is a major source of forage protein for dairy cattle, but, as other legumes, its amino acid profile is unable to fully meet nutrient requirements. Modern bioinformatic tools (i.e., Resido, BLAST, UniProt) can be used to assess the alfalfa proteome and identify possible peptide/protein targets for amino acid enrichment or optimization. The alfalfa proteome contains key proteins of interest containing higher than average sulfur-containing amino acids (methionine and cysteine), methionine (specifically), and lysine. Alfalfa proteins, on average, contain 4.76% sulfur amino acids, 2.79% methionine specifically, and 6.94% lysine. Using Resido, we identified an alfalfa protein composed of 28.81% sulfur amino acids, a protein with 17.12% methionine, and a protein with 37.21% lysine. We have created lists of the “top ten” proteins containing these amino acids of interest. Characterization of these proteins identified potential targets for overexpression and/or cisgenic modification that may be helpful for modifying the amino acid content of this important forage crop.