David J. Schingoethe Symposium Reviews Amino Acid Nutrition of Lactating Dairy Cows

By David P. Casper, ASAS Foundation Chair

On March 20, the American Dairy Science Association (ADSA) and the American Society of Animal Science (ASAS) recognized Dairy Scientist Dr. David J. Schingoethe with a symposium in his honor on amino acid nutrition of lactating dairy cows. Schingoethe, Retired Distinguished Professor Emeritus of Dairy Science at South Dakota State University, devoted his career to research, teaching, and mentoring of graduate and undergraduate students in Dairy Cattle Nutrition and Physiology.

David Schingoethe obtained his B.S. in Animal Science in 1964 and his M.S. in 1965, working under Dr. Bruce Larson at the University of Illinois. Dr. Schingoethe received his Ph.D. in 1968 from Michigan State University working with Dr. Bill Thomas. In 1969, Dr. Schingoethe joined South Dakota State University as Assistant Professor of Dairy Science. He was promoted to Associate Professor in 1973 and to Full Professor in 1980. Dr. Schingoethe was advisor to 9 Ph.D.’s, 37 Master’s and hundreds of undergraduate students in Dairy Science during his 42 years of Research and Teaching at South Dakota State University.

Dr. Schingoethe’s presentation was an overview of the history of amino acid research in lactating dairy cows. Dave covered the history prior to and during his prestigious career. Dave covered the scientific understanding of the origins of milk proteins and how scientific advances in the use of radioactive isotopes, separation and identification of specific milk and blood proteins, and the advancing knowledge on milk protein synthesis led to the discovery that milk proteins were indeed synthesized in the mammary gland from essential amino acids. Dr. Schingoethe went on to state that over the years all 10 essential amino acids and even tyrosine have been cited in the literature to be first limiting for milk and milk protein yields. However, methionine and lysine are usually the first limiting amino acids when typical diets are fed to lactating dairy cows. Dr. Schingoethe concluded his presentation by stating that our work isn’t done yet, because of the optimization needed in ration formulation based on knowledge yet to be learned on amino acid requirements, synthesis of ruminal microbial protein, intestinal digestion proteins and amino acids, and the absorption of amino acids so that accurate models can be formulated based on facts.

Dr. David Casper, South Dakota State University, reviewed Schingoethe’s work using heat treated proteins and ruminally protected methionine and/or lysine that demonstrated that methionine is the most limiting amino acid for milk and milk protein yield. Casper reviewed the long term and short term trials that demonstrated feeding ruminally protected methionine altered blood amino acid status,
the first limiting amino acid, and the subsequent improvements in milk and milk protein yields when methionine and lysine were fed to lactating dairy cows.

Dr. Daryl Kleinschmit, Agri-King, Inc., reviewed the factors affecting mammary blood flow and that mammary blood flow is a major factor regulating milk protein synthesis. Amino acid supplementation can increase blood amino acid concentrations, but the reduction in mammary blood flow may explain the inconsistencies in feeding ruminally protected amino acids on commercial dairies. Schingoethe’s research program on feeding high fat diets to dairy cows had demonstrated that dietary fat reduced mammary blood flow and improve milk production efficiency which explains the lower milk protein percentages. The reduction in milk protein percentages could be partially alleviated by feeding ruminally protected amino acids, but other mechanisms need to be explored to increase mammary blood flow.

Dr. Kamal Mjoun, Alltech, Inc., discussed the differences among the various models in their ability to predict amino acid adequacy when lactating dairy cows are fed diets based on distillers dried grains and other protein sources. Using both book values for ingredients compared to analyzed values of ingredients reduced the coefficient of variation across these different models. However, these different models still indicated that significant variation existed in their ability to predict nutrient availability and animal performance. The models also indicated that significant amounts of amino acids were being used as an energy source to support milk production.

Dr. Mike Brouk, Kansas State Extension Dairy Specialist, discussed why models work or don’t work on the dairy operation. There are many factors outside the use and predictability by a model that can influence the performance of the ration. Differences in dry matter concentrations, nutrient composition, TMR mixing, feed sorting, over-crowding, forage quality, etc. were all factors that could affect why a particular amino acid model does or does not work on the dairy operation. The experience of the person conducting the ration formulation and monitoring performance of the cows by physically walking the pens and evaluating cows can dramatically influence if the model will be successful or not in obtaining the desired performance.

The goal of the Schingoethe symposium is to focus on a specific topic of Dairy Cattle Nutrition each year that can range from calf nutrition through lactating dairy cows. The symposium can/will be a combination of invited presentations and selected abstracts that mesh with the symposium focus that particular year. This year’s inaugural symposium was well attended and is available as a webinar on www.asas.org.

This year’s inaugural symposium was chaired by David P. Casper, Assistant Professor of Dairy Science, SDSU and a former M.S. and Ph.D. student of Dr. Schingoethe and the invited speakers were former SDSU graduate students. The David J. Schingoethe Appreciation club is managed by the ASAS Foundation. Fund raising will be occurring in the upcoming months to ensure the symposium continues for future Midwest ADSA/ASAS Meetings.

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