

CURRICULUM VITAE OF JAMES C. MATTHEWS

OFFICE ADDRESS

207 W. P. Garrigus Building
University of Kentucky
Lexington, KY 40546-0215

Telephone: (859) 257-7513
Telefax: (859) 257-5318
e-Mail: jmatthew@uky.edu

ACADEMIC APPOINTMENTS

1. Professor

Department of Animal and Food Sciences (beef cattle nutrition)
University of Kentucky, Lexington, KY 40546
Appointment Date: July 1, 2012.
Average Research/Teaching effort: 84%:16%

2. University of Kentucky-Alltech Professor of Applied Nutritional Sciences (2008 - 2014)

3. Adjunct Associate Professor (February 2008 - January 2011).

Department of Animal and Poultry Sciences
University of Guelph, Guelph, Ontario

4. Graduate Center for Nutritional Sciences, University of Kentucky (since 1998)

EDUCATION

Postdoctoral Research Fellow - University of Florida College of Medicine, Gainesville, FL. May 1995 - December 1997. Dual appointment in the Department of Biochemistry and Molecular Biology and the Department of Pediatrics.

Mentors: Michael S. Kilberg, Ph.D.; Donald A. Novak, M.D.

Doctor of Philosophy - Virginia Tech, College of Agriculture and Life Sciences, Blacksburg, VA. January 1992 - May 1995. Animal Science (Ruminant Nutrition).

Major Advisor: Kenneth E. Webb, Jr., Ph.D.

Master of Science - Virginia Tech, College of Agriculture and Life Sciences, Blacksburg, VA. September 1989 - December 1991. Animal Science (Ruminant Nutrition).

Major Advisor: Kenneth E. Webb, Jr., Ph.D.

Bachelor of Science - Rutgers University, Cook College, New Brunswick, NJ. September 1985 - December 1988. Animal Science (Preparation for Research)/Nutrition.

Research Mentor: James E. Wohlt, Ph.D.

CURRENT TEACHING PROGRAM

Physiology of Digestion and Nutrient Absorption (ASC 689, 3 credits) - **Instructor** (100%, 48 lecture periods, since fall 1998). Prerequisite: BCH 601 or equivalent. I will continue to teach this course the fall semester of even-numbered years.

Protein Metabolism (ASC 683, 2 credits) - **Instructor** (100%, 32 lecture periods, since fall 1999). Prerequisite: BCH 601 or equivalent. I will continue to teach this course the fall of odd-numbered years.

Department of Animal and Food Sciences Graduate Seminar (ASC 771, 1 credit) - **Instructor** (100%, 16 lecture periods every fall and spring since 2012). Prerequisite: AFS graduate student. I will continue to teach this course the fall and spring semesters of every year.

RESEARCH PROGRAM OVERVIEW

My program of research in nutritional physiology has focused on the molecular study and

CURRICULUM VITAE OF JAMES C. MATTHEWS

characterization of nutrient transporters, and enzymes that either produce or metabolize transporter substrates. Because of their importance in nutrient assimilation and use, my past program emphasized the study of tissue-, age-, diet-, metabolic acidosis, and ergot alkaloid-dependent expression and activity of these proteins in ruminants. Based on findings from these commercially-relevant experimental models, my current research interests and efforts have focused on identifying if and how the energy and/or nitrogen status of cells regulates/coordinates the expression and function of amino acid enzyme/transporter “functional units”. Accordingly, all of my current research projects include targeted and multiple gene and protein expression profiling. However, my broad research stratagem is not to study/characterize complete transcriptomes or proteomes but rather to understand how constitutive and inducible aspects of specific targeted biochemical pathways are regulated in response to physiological challenges of importance to production agriculture. My current research foci are (1) to identify the mechanisms by which different forms of selenium in free-choice vitamin-mineral mixes ameliorate the negative effects of fescue toxicosis on growth and fertility, and (2) to discover how the expression and function of amino acid transporters and metabolizing enzymes are coordinated to support the development and finishing of cattle and pigs.

SYNERGISTIC ACTIVITIES

Industry – Kentucky Cattlemen’s Association, Research Chairman, Kentucky Beef Council Committee (2019 to 2022).

Journals - Editorial Board Member: J. Anim. Sci (2001-2004); Ad hoc reviewer: Science Reports, Amino Acids, BMC Genomics, PLoS ONE, Physiological Genomics, J. Anim. Sci., J. Anim. Sci. & Biotech., J. Biol. Chem., J. Dairy Sci., J. Physiol., J. Nutrition, J. Nutritional Biochemistry

Grants – Review Panel Member: USDA NIFA Competitive Grants Program; Ad hoc reviewer: NSF - Integrated Organism Systems, USDA-NRICGP, USDA-BARD, Natural Sciences and Engineering Research Council of Canada, National Science Centre of Poland, Vienna Science and Technology Fund.

Critical University of Kentucky Committee Service

Agricultural Biotechnology Program Coordinating Comm. (1999 – 2012); University Radiation Safety Comm. (2002 – 2008); University Biological Safety Comm. (2008 – 2011), University Senate Advisory Comm. – Faculty Code (2017 - 2018).

Knowledge Transfer

Conceived, organized, and sponsored (as the University of Kentucky-Alltech Professor of Applied Nutritional Sciences) 4 workshops (experimental design, RNA processing, RNA-silencing, bioinformatic analysis, and statistical analyses), nine seminars, and 3 symposiums on nutrigenomics, epigenetics, and microRNA by leading researchers from Harvard, Dartmouth, Uni. of Louisville, Univ. of Illinois, Penn State Univ., Univ. of California, The Ohio State Univ., Texas A&M Univ., Texas Health Science Center San Antonio, INRA, and Queen’s Medical

CURRICULUM VITAE OF JAMES C. MATTHEWS

Centre. Over 1,200 undergraduate and graduate students, postdoctoral fellows, and faculty from Eastern Kentucky Univ. and private industry groups attended these presentations.

PUBLICATIONS

Most of my publications have been in agricultural journals because of species relevance. In addition, due to the cross-species fundamental nature of my research, I also have a significant number of publications in biomedical journals, and a significant number of contributions to international gene expression omnibus (GSE) and gene sequence (GenBank) databases.

Summary of Publications by James C. Matthews

Publication Type	Total	In Review
Refereed Journal Articles	67	3
Refereed Abstracts	93	
Invited Book and Symposium Chapters	10	
Invited Symposium Proceedings	6	
Gene Expression Omnibus Deposits (GSE microarray datasets)	9	
GenBank Deposits (full & partial-length clones)	10	
GenBank Deposits (RT-PCR cDNA products)	88	14
Patents	1	

Selected Recent Refereed Journal Articles (of 67)

Form of Supplemental Selenium in Vitamin-mineral Mix Amelioration of Fescue Toxicosis

- Y. Jia, K. Son, W. R. Burris, P. J. Bridges, and **J. C. Matthews**. 2019. Forms of Selenium in Vitamin-mineral mixes Differentially Affect Serum Alkaline Phosphatase Activity, and Serum Albumin and Blood Urea Nitrogen Concentrations, of Beef Steers Grazing Endophyte-infected Tall Fescue. *Journal of Animal Science* 97:2569-2582. doi:10.1093/jas/skz109.
- Q. Li, Y. Jia, W. R. Burris, P. J. Bridges, and **J. C. Matthews**. 2019. Forms of Selenium in Vitamin-mineral Mixes Differentially Affect the Expression of Genes Responsible for Prolactin, ACTH, and α -MSH Synthesis and Mitochondrial Dysfunction in Pituitaries of Steers Grazing Endophyte-infected Tall Fescue". *Journal of Animal Science* 97:631-643. doi:10.1093/jas/sky438.
- Y. Jia, Q. Li, W. R. Burris, G. E. Aiken, P. J. Bridges, and **J. C. Matthews**. 2018. Forms of Selenium in Vitamin-mineral Mixes Differentially Affect Serum Prolactin Concentrations and Hepatic Glutamine Synthetase Activity of Steers Grazing Endophyte-infected Tall Fescue. *Journal of Animal Science* 96:715-727. doi.org/10.1093/jas/skx068.
- Q. Li, R. Hegge, P. J. Bridges, and **J. C. Matthews**. 2017. Pituitary Genomic Expression Profiles of Steers Are Altered by Grazing of High vs. Low Endophyte-infected Forages. *PLOS ONE* 12:e0184612. <https://doi.org/10.1371/journal.pone.0184612>.
- K. L. Cerny, L. Anderson, W. R. Burris, M. Rhoads, **J. C. Matthews**, and P. J. Bridges. 2016. Form of Supplemental Selenium Fed to Cycling Cows Affects Systemic Concentrations of Progesterone but not those of Estradiol. *Theriogenology* 85:800-806. doi:10.1016/j.theriogenology.2015.10.022
- J. J. Jackson, M. D. Lindemann, J. A. Boling, and **J. C. Matthews**. 2015. Summer-long Grazing

CURRICULUM VITAE OF JAMES C. MATTHEWS

- of High versus Low Endophyte (*Neotyphodium coenophialum*)-infected Tall Fescue by Growing Beef Steers Results in Distinct Temporal Blood Analyte Response Patterns, with Poor Correlation to Serum Prolactin Levels. *Frontiers in Veterinary Science* doi:10.3389/fvets.2015.00077.
- S. F. Liao, J. A. Boling and **J. C. Matthews**. 2015. Gene Expression Profiling Reveals An Increased Capacity for Proline, Serine, and ATP Synthesis, and Mitochondrial Mass, by the Liver of Steers Grazing High vs. Low Endophyte-infected Tall Fescue. *Journal of Animal Science* 93:1-13. doi:10.2527/jas2015-9193.
- K. L. Cerny, S. Garbacik, C. Skees, W. R. Burris, **J. C. Matthews**, and P. J. Bridges. 2015. Gestational Form of Selenium in Free-choice Mineral Mixes Affects Transcriptome Profiles of Neonatal Calf Testis, including those of Steroidogenic and Spermatogenic Pathways. *Biological Trace Element Research* 169:56-68. doi:10.1007/s12011-01500386-4.
- J. C. Matthews**, Z. Zhang, J. D. Patterson, P. J. Bridges, A. J. Stromberg, and J. A. Boling. 2014. Hepatic Transcriptome Profiles Differ among Maturing Beef Heifers Supplemented with Inorganic, Organic, or Mixed (50% inorganic:50% organic) Forms of Dietary Selenium. *Biological Trace Element Research* 160:321-339. doi: 10.1007/s12011-014-0050-4.
- J. C. Matthews**, and P.J. Bridges. 2014. NutriPhysioGenomics Applications to Identify Adaptations of Cattle to Consumption of Ergot Alkaloids and Inorganic Versus Organic Forms of Selenium: Altered Nutritional, Physiological and Health States? *Animal Production Science* 54:1594-1604.
- J. D. Patterson, W. R. Burris, J. A. Boling and **J. C. Matthews**. 2013. Individual Intake of Free-choice Mineral Mix by Grazing Beef Cows May Be Less than Typical Formulation Assumptions and Form of Selenium in Mineral Mix Affects Blood Se Concentrations of Cows and their Suckling Calves. *Biological Trace Mineral Research* 155:38-48.
- J. L. Klotz, K. R. Brown, Y. Xue, **J. C. Matthews**, J. A. Boling, W. R. Burris, L. P. Bush, and J. R. Strickland. 2012. Alterations in Serotonin Receptor-induced Contractility of Bovine Lateral Saphenous Vein in Cattle Grazing Endophyte-infected Tall Fescue. *Journal of Animal Science* 90:682-693.
- Y. Xue, J. R. Strickland, J. A. Boling, **J. C. Matthews**. 2011. Bovine Vesicular Glutamate Transporter Activity Is Inhibited by Ergovaline and Other Ergopeptines. *Journal of Dairy Science* 94:3331-3341.
- E. D. Miles, Y. Xue, J. R. Strickland, J. A. Boling, and **J. C. Matthews**. 2011. Ergopeptines Bromocriptine and Ergovaline, and Domperidone, Inhibit Bovine Equilibrative Nucleoside Transporter 1-like Activity. *Journal of Agriculture and Food Chemistry*. 59:9691-9699.
- J. R. Strickland, M. L. Looper, **J. C. Matthews**, C. F. Rosenkrans, M. D. Flythe, and K. R. Brown. 2011. BOARD-INVITED REVIEW: St. Anthony's Fire in Livestock: Causes, Mechanisms and Potential Solution. *Journal of Animal Science* 89:1603-1626.
- K. M. Brennan, W. R. Burris, J. A. Boling and **J. C. Matthews**. 2011. Selenium Content in Blood Fractions and Liver of Beef Heifers is Greater with a Mix of Inorganic/Organic or Organic Versus Inorganic Supplemental Selenium Forms but the Time Required for Maximal Assimilation is Tissue-specific. *Biological Trace Mineral Research*, 144:504-516.
- S. F. Liao, K. R. Brown, A. J. Stromberg, W. R. Burris, J. A. Boling, and **J. C. Matthews**. 2010. Dietary Supplementation of Selenium in Inorganic and Organic Forms Differentially and Commonly Alters Blood and Liver Selenium Concentrations and Liver Gene Expression Profiles of Growing Beef Heifers *Biological Trace Element Research* 140:151-169.

CURRICULUM VITAE OF JAMES C. MATTHEWS

K. R. Brown, G. A. Anderson, K. Son, G. Rentfrow, L. P. Bush, J. L. Klotz, J. R. Strickland, J. A. Boling, and **J. C. Matthews**. 2009. Growing Steers Grazing High versus Low Endophyte (*Neotyphodium coenophialum*)-infected Tall Fescue Have Reduced Serum Enzymes, Increased Hepatic Glucogenic Enzymes, and Reduced Liver and Carcass Mass. *Journal of Animal Science* 87:748-760.

Developmental Physiology

- J. Huang, Y. Jia, Q. Li, K. Son, C. Hamilton, P. J. Bridges, A. J. Stromberg, and **J. C. Matthews**. 2018. Glutathione Content and Expression of Proteins Involved with Glutathione Metabolism Differs in Longissimus Dorsi, Subcutaneous Adipose, and Liver Tissues of Finished vs. Growing Beef Steers. *Journal of Animal Science* 96:5152-5165. doi.org/10.1093/jas/sky362.
- J. Huang, Y. Jia, Q. Li, W. R. Burris, P. J. Bridges, and **J. C. Matthews**. 2018. Hepatic Glutamate Transport and Glutamine Synthesis Capacities Are Decreased in Finished Vs. Growing Beef Steers, Concomitant with Increased GTRAP3-18 Content. *Amino Acids* 50:153-125. doi :10.1007/s00726-018-2540-8.
- K. L. Cerny, Q. Li, **J. C. Matthews**, P. J. Bridges. 2017. Effect of Lipopolysaccharide (LPS) on the Expression of Inflammatory mRNAs and MicroRNAs in the Mouse Oviduct. *Reproduction, Fertility and Development*. doi: 10.1071/RD117241.
- E. D. Miles, B. W. McBride, J. A. Boling, P. J. Bridges, and **J.C. Matthews**. 2017. Effect of 17 β -estradiol administration on hepatic glutamine synthetase, β -catenin, and GPR30 in young and aged beef cows. *Canadian Journal of Animal Sciences* doi: 10.1139/CJAS-2016-0002.
- J. C. Matthews**, J. Huang, and G. Rentfrow. 2016. High-affinity Glutamate Transporter and Glutamine Synthetase Content in Longissimus Dorsi and Adipose Tissues of Growing Angus Steers Differs among Suckling, Weanling, Backgrounding, and Finishing Production Stages. *Journal of Animal Science* 94:1267-75. doi: 10.2527/jas.2015-9901.
- E. D. Miles, B. W. McBride, Y. Yang, S. F. Liao, J. A. Boling, P. J. Bridges, and **J. C. Matthews**. 2015. Glutamine Synthetase (GS) and Alanine Transaminase Expression Are Decreased in Livers of Aged vs. Young Beef Cows and GS can be Up-regulated by 17 β -estradiol Implants. *Journal of Animal Science* 93:4500-4509. doi 10.2527/jas2015-9294.
- S. F. Liao, J. S. Monegue, M. D. Lindemann, G. L. Cromwell, and **J. C. Matthews**. 2010. Dietary Supplementation of Boron Differentially Affects Expression of Borate Transporter (NaBC1) mRNA by Jejunum and Kidney of Growing Pigs. *Biological Trace Element Research* 143:901-912.
- C. C. Taylor-Edwards, D. G. Burrin, **J. C. Matthews**, K. R. McLeod, J. J. Holst, and D. L. Harmon. 2010. Expression of mRNA for Proglucagon and Glucagon-like Peptide-2 (GLP-2) Receptor in the Ruminant Gastrointestinal Tract and the Influence of Energy Intake. *Domestic Animal Endocrinology*, 39:181-193.
- S. F. Liao, D. L. Harmon, E. S. Vanzant, K. R. McLeod, J. A. Boling, and **J. C. Matthews**. 2010. The Small Intestinal Epithelia of Beef Steers Differentially Express Sugar Transporter mRNA in Response to Abomasal vs Ruminant Infusion of Starch Hydrolysate. *Journal of Animal Science* 88:306-314.
- S. F. Liao, E. S. Vanzant, D. L. Harmon, K. R. McLeod, J. A. Boling, and **J. C. Matthews**. 2009. Ruminant and Abomasal Starch Hydrolysate Infusions Selectively Decrease the Expression of Cationic Amino Acid Transporter mRNA by Small Intestinal Epithelia of Forage-fed Beef Steers. *Journal of Dairy Science* 92:1124-1135.

CURRICULUM VITAE OF JAMES C. MATTHEWS

GENE EXPRESSION OMNIBUS (GEO microarray datasets)

- GSE 115802 - Affymetrix WT Btau 4.0 Array (version 1) Gene Chip experiment (21 microarrays) associated with “Forms of Selenium in Vitamin-mineral Mixes Differentially Affect Hepatic Gene Expression of Steers Grazing Endophyte-infected Tall Fescue”. Y. Jia, and **J. C. Matthews** (PI). Release date: July 13, 2018.
- GSE 114893 - Affymetrix WT Btau 4.0 Array (version 1) Gene Chip experiment (20 microarrays) associated with “Forms of Selenium in Vitamin-mineral Mixes Differentially Affect the Expression of Genes Responsible for Prolactin and ACTH Synthesis and Mitochondrial Dysfunction in Pituitaries of Steers Grazing Endophyte-infected Tall Fescue”. **James C. Matthews** (PI). Released May 25, 2018.
- GSE107881 - Affymetrix WT Btau 4.0 Array (version 1) Gene Chip experiment (16 microarrays) associated with “Hepatic Gene Expression Profiles of Growing versus Finishing Beef Steers”. **James C. Matthews** (PI). Released December 11, 2017.
- GSE62570 - Affymetrix WT Btau 4.0 Array (version 1) Gene Chip experiment (16 microarrays) associated with “Pituitary Gene Expression Profiles of Growing Beef Steers Grazing High versus Low Endophyte-Infected Tall Fescue Grass”. **James C. Matthews** (PI). Released October 23, 2014.
- GSE62382 – Affymetrix Bovine Gene 1.0 ST Array (version 1) Gene Chip experiment (13 microarrays) associated with “Neonatal Testis Transcriptome Profiles Differ among Calves Born to Cows Supplemented with Different Forms of Dietary Selenium throughout Gestation”. **James C. Matthews** (Co-PI). Released October 16, 2014.
- GSE44680 – Affymetrix WT Btau 4.0 Array (version 1) Gene Chip experiment (36 microarrays) associated with “Hepatic Transcriptome Profiles Differ among Maturing Beef Heifers Supplemented with Different Forms of Dietary Selenium”. **James C. Matthews** (PI).
- GSE23894 - Affymetrix Bovine Gene Chip experiment (19 microarrays) associated with “Hepatic Gene Expression Profiles of Growing Beef Steers Grazing High versus low Endophyte-infected Tall Fescue Grass”. **James C. Matthews** (PI). Released November 30, 2010.
- GSE19696 - Affymetrix Bovine Gene Chip experiment (18 microarrays) associated with “Dietary Supplementation of Selenium in Inorganic and Organic Forms Differentially and Commonly Alters Blood and Liver Selenium Concentrations and Liver Gene Expression Profiles of Growing Beef Heifers”. **James C. Matthews** (PI). Released April 19, 2010.
- GSE17849 - Affymetrix Bovine Gene Chip experiment (12 microarrays) associated with “Effect of Dietary Grain on Rumen Papillae Gene Expression in Holstein Dairy Cows”. **James C. Matthews** (Co-PI). Released August 28, 2009.

INVITED BOOK CHAPTERS (of 10)

- B. M. Zanghi and **J. C. Matthews**. 2010. Physiological Importance and Mechanisms of Protein Hydrolysate Absorption. In: V. K. Pasupuleti and A. L. Demain (Eds.) Protein Hydrolysates in Biotechnology. Chapter 9, pages 135-177. Springer, Secaucus, New Jersey.
- J. C. Matthews**, and G. L. Sipe. Patterns and Putative Regulatory Mechanisms of High-Affinity Glutamate Transporter Expression by Ruminants. 2006. Proceedings of the Xth International Symposium on Ruminant Physiology, Copenhagen, Denmark. Pages 263-287.
- J. C. Matthews**. Expression and Function of Non-Organelle Glutamate Transporters to Support Peripheral Tissue Function. 2005. In: S. Gill and O. Pulido (Eds.) Glutamate Receptors in

CURRICULUM VITAE OF JAMES C. MATTHEWS

- Peripheral Tissues: Excitatory Transmission Outside the Central Nervous System. Chapter 1, pages 1-30. Kluwer Academic/Plenum Press, New York.
- C. R. Krehbeil and **J. C. Matthews**. Absorption of Amino Acids and Peptides. 2003. In: J. P. F. D'Mello (Ed.) Amino Acids in Animal Nutrition, 2nd edition. Chapter 3, pages 41-70. CAB International, Wallingford.
- M. S. Kilberg and **J. C. Matthews**. 2001. Amino Acid Transporters. In Embryonic Encyclopedia of Life Sciences. Encyclopedia of Life Sciences. John Wiley and Sons, Ltd. www.els.net. Pages 1-6.
- J. C. Matthews**. 2000. Peptide Absorption: Where Peptides Fit in Protein Nutrition and Metabolism. In: T.P. Lyons and K. A. Jacques (Ed.) Biotechnology in the Feed Industry. Proceeding's of Alltech's Sixteenth Annual Symposium. Pages 357-368. Nottingham University Press, Nottingham.
- J. C. Matthews**. 2000. Mechanisms of Peptide and Amino Acid Transport. In: J. P. F. D'Mello (Ed.) Farm Animal Metabolism and Nutrition: Critical Reviews. Chapter 1, pages 3-23. CAB International, Wallingford.