

**Faculty Research Interests**  
**Department of Animal and Food Sciences**  
**University of Delaware**

**ALPHIN, ROBERT L**, M.S., Instructor, Public Service Faculty/ Manager, Charles C. Allen Laboratory  
Discipline: Poultry Management and Microbiology

Research: Emergency poultry disease response (e.g. avian influenza and Newcastle disease) including emergency depopulation of poultry, in-house composting of litter/poultry carcasses and testing of disinfectants for avian disease decontamination.

R.L. Alphin, M.K. Rankin, K.J. Johnson, and E.R. Benson. 2009. Comparison of Water-Based Foam and Inert-Gas Mass Emergency. *Avian Diseases* 53:000–000.

R.L. Alphin, C. Ciaverelli, D.P. Hougentogler, K.J. Johnson, M.K. Rankin, and E.R. Benson. 2009. Post Outbreak Disinfection of Mobile Equipment. *Avian Diseases* Accepted for publication.

R.L. Alphin, K.J. Johnson, B.S. Ladman, and E.R. Benson. 2009. Inactivation of Avian Influenza Virus Using Five Common Chemicals and One Detergent. *Poultry Science* 88: 1181-1185.

M.D. Dawson, K.J. Johnson, E.R. Benson, R.L. Alphin and G.W. Malone. 2009. Determining Brain Death in Depopulated Broilers Using Accelerometers. *J. Applied Poultry Research* 18:135-142.

E.R. Benson, R.L. Alphin, M.D. Dawson, and G. W. Malone. 2009. Use of water based foam to depopulate ducks and other species. *Poultry Science* 88:904-910

M.D. Dawson, K.J. Johnson, E.R. Benson, R.L. Alphin and G.W. Malone. 2008. Determining Brain Death in Depopulated Broilers Using Accelerometers. *Journal of Applied Poultry Research*. Submitted 6/28/2008. JAPR-08-00072. Accepted. TBC J. Appl. Poult. Res. TBC:1–8 doi:10.3382/japr.2008-00072.

E.R. Benson, R.L. Alphin, M.D. Dawson, and G. W. Malone. 2008. Use of water based foam to depopulate ducks and other species. *Poultry Science*. PS-08-00268. Accepted 12/11/2008. TBC Poultry Science TBC:1–7 doi:10.3382/ps.2008-00268

E.R. Benson, G.W. Malone, R.L. Alphin, K.J. Johnson, and E. Staicu. 2008. Application of In-house Composting on Viral Inactivity of Newcastle Disease Virus. *Poultry Science*. *Poult Sci* 2008. 87:627-635. doi:10.3382/ps.2007-00308

M.E. Lombardi, B.S. Ladman, R.L. Alphin, and E.R. Benson. 2008. Inactivation of Avian Influenza Virus Using Common Soaps, Detergents, Chemicals, and Disinfectants. *Avian Diseases*. *Avian Diseases* 52(1): 118–123.

E.R. Benson, G.W. Malone, R.L. Alphin, E. Staicu and K. Johnson. 2007. Application of In house Composting on Viral Inactivity of Newcastle Disease Virus. *Poultry Science*. Submitted.

Benson. E.R., G.W. Malone and R.L. Alphin. 2007. The use of water based foam for mass emergency depopulation of floor reared poultry. *World Poultry magazine*. Submitted 04/11/2007

M. D. Dawson, M. E. Lombardi, E. R. Benson, R. L. Alphin, and G. W. Malone. Using Accelerometers to Determine the Cessation of Activity of Broilers. *J Appl Poult Res* 2007 16(4): 583-591.

Benson, E. R., G. W. Malone, R. L. Alphin, M. D. Dawson, C. R. Pope, and G. L. Van Wicklen. 2007. Foam-based mass emergency depopulation of floor-reared meat-type poultry operations. *Poultry Sci.* 86:219-224.

Alphin. R.L., Common chemicals could be used against bird flu, *Delmarva Farmer Newspaper*. May 8, 2007.

Alphin. R.L., Dealing with avian flu on an international level, *Delmarva Farmer Newspaper*. Nov. 14, 2006.

Alphin. R.L., Biosecurity, planning is key to Delmarva preparedness. *Delmarva Farmer Newspaper*. May 9, 2006.

Dawson. M.D. , P.L. Reyes, E.R. Benson, R.L. Alphin, G.W. Malone, G.L. Van Wicklen, and I. Estevez. 2006. Evaluation of Foam Based Humane Mass Euthanasia Methodology for Floor- Reared Meat-Type Poultry Operations. *Applied Engineering in Agriculture*. 22(5): 787-794.

Malone. G., S. Cloud, R. Alphin, L. Carr and N. Tablante. In-House Composting of Litter and Poultry Carcasses Infected with Avian Influenza. *Poultry Sci.* Vol. 83 (Suppl 1) 2004.

**CHEN, HAIQIANG**, Ph.D., Assistant Professor

*Discipline: Food Processing and Food Safety*

*Research: Current research focuses on high pressure processing, antimicrobial packaging, and modeling. Specific research projects include the use of high pressure processing and antimicrobial packaging to control *Listeria monocytogenes* in ready-to-eat meat and seafood products.*

Neetoo, H., Ye, M., and Chen, H. 2008. Potential application of high hydrostatic pressure to eliminate *Escherichia coli* O157:H7 on alfalfa sprouted seeds. *Int. J. Food Micro.* 128: 348-353.

Ye, M., Neetoo, H., and Chen, H. 2008. Effectiveness of chitosan-coated plastic films incorporating antimicrobials in inhibition of *Listeria Monocytogenes* on cold-smoked salmon. *Int. J. Food Micro.* 127, 235–240.

Kural, A., Shearer, A.E.H., Kingsley, D.H., and Chen, H. 2008. Conditions for high pressure inactivation of *Vibrio parahaemolyticus* in oysters. *Int. J. Food Micro.* 127, 1-5.

Neetoo, H., Ye, M., and Chen, H. 2008. Potential antimicrobials to control *Listeria monocytogenes* in vacuum-packaged cold-smoked salmon fillets and pâté. *Int. J. Food Micro.* 123, 220–227.

Kingsley, D.H. and Chen, H. 2008. Aqueous matrix compositions and pH influence virus inactivation by high pressure processing. *J. Food Prot.* 71: 1598-1603.

Kural, A. and Chen, H. 2008. Conditions for a 5-log reduction of *Vibrio vulnificus* in oysters through high hydrostatic pressure treatment. *Int. J. Food Micro.* 122:180-187.

Neetoo, H, Ye, M. Chen, H., Joerger, R.D., Hicks, D.T., Hoover, D.G. 2008. Use of nisin-coated plastic films to control *Listeria monocytogenes* on vacuum-packaged cold-smoked salmon. Int. J. Food Micro. 122:8-15.

Ye, M., Neetoo, H., and Chen, H. 2008. Control of *Listeria monocytogenes* on ham steaks by antimicrobials incorporated into chitosan-coated plastic films. Food Micro. 25: 260–268.

H. Neetoo, M. Ye, and H. Chen. Potential application of high hydrostatic pressure to eliminate *Escherichia coli* O157:H7 on alfalfa sprouted seeds. Presented at the 2008 IFT Annual Meeting.

H. Neetoo, M. Ye, and H. Chen. Potential application of antimicrobials to Control *Listeria monocytogenes* in vacuum-packaged cold-smoked salmon (CSS) pâté and fillets. Presented at the 2008 IAFP Annual Meeting.

M. Ye, H. Neetoo, and H. Chen. Use of Chitosan-coated Plastic Films Incorporating Antimicrobials to Control the Growth of *Listeria monocytogenes* on Cold-smoked Salmon. Presented at the 2008 IFT Annual Meeting.

Ye, M., Neetoo, H., and Chen, H. 2007. Control of *Listeria monocytogenes* on ham steaks by antimicrobials incorporated into chitosan-coated plastic films. Submitted to Food Micro.

Neetoo, H., Ye, M., and Chen, H. 2007. Use of antimicrobial-coated plastic films to control *Listeria monocytogenes* on cold-smoked salmon. International Smoked Seafood Conference Proceedings.

Neetoo, H, Ye, M. Chen, H., Joerger, R.D., Hicks, D.T., Hoover, D.G. 2007. Use of nisin-coated plastic films to control *Listeria monocytogenes* on vacuum-packaged cold-smoked salmon. Int. J. Food Micro. Revision submitted.

Kural, A. and Chen, H. 2007. Inactivation of *Vibrio vulnificus* in oysters by high pressure and low temperature. Int. J. Food Micro. Submitted.

Neetoo, H., Ye, M., and Chen, H. 2007. The effectiveness and shelf-life of plastic films coated with nisin for inhibition of *Listeria monocytogenes*. J. Food Prot. 70:1267-1271.

Chen, H. 2007. Temperature-assisted pressure inactivation of *Listeria monocytogenes* in turkey breast meat. Int. J. Food Micro. 117:55-60.

Kingsley, D.H., Holliman, D., Calci, K., Chen, H., and Flick, G. 2007. Inactivation of a norovirus by high pressure processing. Appl. Environmental Microbiol. 73: 581-585.

Chen, H. 2007. Use of linear, Weibull, and log-logistic functions to model pressure inactivation of seven foodborne pathogens in milk. Food Micro. 24:197-204.

Kingsley, D.H., Guan, D., Hoover, D.G., and Chen, H. 2006. Inactivation of hepatitis A virus by high pressure processing: the role of temperature and pressure oscillation. J. Food Prot. 69:2454-2459.

Hoover, D. G. and Chen, H. 2006. Processing & Preservative Aids: Bacteriocins. In Encyclopedia of Biotechnology in Agriculture and Food (D. Heldman, A. Bridges, D.G. Hoover, and M. Wheeler, eds.). Marcel Dekker, Inc. New York. In press.

Joerger, R.D., Chen, H., and K. Kniel. 2006. Characterization of a spontaneous *ctsR* deletion mutant of *Listeria monocytogenes* ScottA. *Foodborne Pathogens & Disease*. 3:196-202.

Grove, S.F., Lee, A., Lewis, T., Stewart, C.M., Chen, H., and Hoover, D.G. 2006. Inactivation of food-borne viruses of significance by high pressure and other processes. *J. Food Prot.* 69: 957-968.

Guan, D., Chen, H., and Hoover, D.G. 2006. Inactivation of *Staphylococcus aureus* and *Escherichia coli* O157:H7 under isothermal-endpoint pressure conditions. *J. Food Eng.* 77: 620-627.

Hoover, D.G., Guan, D., and Chen, H. 2006. High hydrostatic pressure processing. In *Advances in Microbial Foods Safety* (V.K. Juneja, J.P. Cherry, and M.H. Tunick, eds.). ACS Symposium Series, American Chemical Society, Washington, DC.

Chen, H., Guan, D., and Hoover, D.G. 2006. Sensitivities of foodborne pathogens to pressure changes. *J. Food Prot.* 69:130-136.

Chen, H., Hoover, D.G., and Kingsley, D.H. 2005. Temperature and treatment time influence high hydrostatic pressure inactivation of feline calicivirus, a norovirus surrogate. *J. Food Prot.* 68:2389–2394.

Hoover, D. G. and Chen, H. 2005. Bacteriocins with potential for use in foods. In *Antimicrobials in Foods* (P.M. Davidson and A.L. Branen, eds.). Marcel Dekker, Inc. New York.

Guan, D., Chen, H., and Hoover, D.G. 2005. Inactivation of *Salmonella* Typhimurium DT 104 in UHT whole milk by high hydrostatic pressure. *Int. J. Food Microbiol.* 104: 145-153.

Chen, H and Hoover, D.G. 2004. Use of Weibull model to describe and predict pressure inactivation of *Listeria monocytogenes* Scott A in whole milk. *Innov. Food Sci. Emerg. Technol.* 5:269-276.

**COGBURN, LARRY A., Ph.D., Professor**

*Discipline: Avian Physiology*

*Research: Endocrine regulation of growth and development in broiler chickens. Research program involves manipulation of the thyrotropic axes to enhance growth rate and improve body composition. We were the first to clone and characterize the chicken growth hormone receptor (cGHR) gene and have identified molecular defects in the cGHR gene which are responsible for sex-linked dwarfism in chickens. Recently, we have examined the developmental expression and tissue distribution of the cGHR in different strains of broiler chickens genetically selected for growth rate, high body fat or increased lean body mass. We have also discovered the expression of unique truncated transcripts of the prolactin receptor gene in the testes of sexually-mature chickens which could be important for normal sexual maturation and reproductive competence in the rooster. My overall research program is directed at the application of molecular biology to improve the efficiency and/or quality of poultry meat production.*

Rev. October 2009

Wang, X., R.F. Newkirk, W. Carre, P. Ghose, B. Igobudia, J. G. Townsel and L. A. Cogburn, 2009. Regulation of *ANKRD9* expression by lipid metabolic perturbations. *BMB Reports* 42:568-573.

Nadaf, J., F. Pitel, H. Gilbert, M.J. Duclos, F Vignoles, C. Beaumont, A. Vignal, S. E. Aggrey, T.E. Porter, L.A. Cogburn, J. Simon and E. Le Bihan-Duval, 2009. QTL for several metabolic traits map to loci controlling growth and body composition in a F2 intercross between high-growth and low-growth chicken lines. *Physiological Genomics* 38:241-249.

Le Mignon, G., F. Pitel, H. Gilbert, E. Le Bihan-Duval, F. Vignoles, O. Demeure, S. Lagarrigue, J. Simon, L. A. Cogburn, S. E. Aggrey, M. Douaire and P. Le Roy, 2009. A comprehensive analysis of QTL for abdominal fat and breast muscle weights on chicken chromosome 5 using a multivariate approach. *Animal Genetics* 40:157-164.

Byerly, M. S., J. Simon, E. Le Bihan-Duval, M. J. Duclos, L. A. Cogburn and T. E. Porter, 2009. Effects of BDNF, T3 and corticosterone on expression of the hypothalamic obesity gene network *in vivo* and *in vitro*. *AJP-Regulatory, Integrative and Comparative Physiology* 296:R1180-1189.

Dupont J, Tesseraud S, Derouet M, Collin A, Rideau N, Crochet S, Godet E, Cailleau-Audouin E, Metayer-Coustard S, Duclos MJ, Gespach C, Porter TE, Cogburn LA, and Simon J, 2008. Insulin immune neutralization in chicken: effects on insulin signaling and gene expression in liver and muscle. *J Endocrinol* 2008, 197:531-542.

Cogburn, L. A., T. E. Porter, M.J. Duclos, J. Simon, S. C. Burgess, J.J. Zhu, H.H. Cheng, J. B. Dodgson and J. Burnside, 2007. Functional genomics of the chicken—a model organism. *Poultry Sci.* 86:2059-2094

Nadaf, J., H. Gilbert, F. Pitel, C. Beaumont, C. M. Berri, M. J. Duclos, T.E. Porter, J. Simon, S. E. Aggrey, L. A. Cogburn, E. Le Bihan-Duval, 2007. Identification of QTL controlling several meat parameters in a F2 cross between two chicken lines selected for either low or high growth. *BMC Genomics* 8:155.

Wang, X., W. Carré, A. M. Saxton and Cogburn, L.A., 2007. Manipulation of thyroid status and/or GH Injection alters hepatic gene expression in the juvenile chicken. *Cytogenet. Genome Res.* 117:174-188.

Dichlberger, A., L. A. Cogburn, J. Nimpf, and W. J. Schneider. 2007. Avian apolipoprotein AV binds to LDL receptor gene family members. *J. Lipid Res.* 48:1451-1456.

Walzem, R. L., R. A. Baillie, M. Wiest, R. Davis, S. M. Watkins, J. Simon, T. E. Porter, and L. A. Cogburn. 2007. Functional annotation of genomic data with metabolic inference. *Poult. Sci.* 86:1510-1522.

Carre, W., X. Wang, T. E. Porter, Y. Nys, J-S Tang, E. Bernberg, R. Morgan, J. Burnside, S.E. Aggrey, J. Simon, and Cogburn, L. A., 2006. Chicken functional genomics resource: sequencing and annotation of 35,407 ESTs from single and multiple tissue cDNA libraries and CAP3 assembly of a chicken gene index. *Physiol. Genomics* 25:514-524

Ellestad, L.E., W Carre, M. Muchow, S.A. Jenkin, X. Wang, L.A. Cogburn, and T.E. Porter, 2006. Gene expression profiling during cellular differentiation in the embryonic pituitary gland using cDNA microarrays. *Physiol Genomics* 25:414-425

Lagarrigue, S., F. Pitel, W. Carré, B. Abasht, P. Le Roy, A. Neau, Y. Amigues, M. Sourdioux, J. Simon, L.A. Cogburn, S. Aggrey, B. Leclercq, A. Vignal and M. Douaire, 2006. Mapping of quantitative trait loci affecting fatness and breast muscle weight in experimental meat type chicken lines divergently selected on fatness *Genet. Select. Evol.* 38: 85-97

Abasht, B., Pitel, F., Lagarrigue, S., Le Bihan-Duval, E., Le Roy, P., Demeure, O., Simon J., Cogburn, L. A., Aggrey, S.E., Vignal, A. and Douaire, M. 2005. Fatness QTL on chicken chromosome 5 and interaction with sex. *Genet. Select. Evol.* 38:297-311

Wang, X., W. Carre, L. Rejto and L.A Cogburn, 2005. Chapter 3. Transcriptional Profiling in Liver of Hormonally-manipulated Chickens. In: *Functional Avian Endocrinology* (A

Dawson & PJ Sharp, Eds) Narosa Publishing House, New Delhi, India, pp 27-44 Burnside, J. L.A. Cogburn, R. Talbot and J.B. Dodgson. 2005. Chapter 1. Genomic Tools for Endocrine Research. In: *Functional Avian Endocrinology* (A Dawson & PJ Sharp, Eds), Narosa Publishing House, New Delhi, India, pp 3-10.

#### *Patent applications*

Cogburn, L. A., Molecular Markers for Identification of Fat and Lean Phenotypes in Chickens, U.S. Patent Application, Serial No. 60/359,846 filed February 27, 2003. [Pub. No.: US 2003/0186299 A1; Pub. Date: Oct. 2, 2003]

Cogburn, L. A., Molecular Markers for Identification of Fat and Lean Phenotypes in Chickens, U.S. Patent Application, Serial No. 11/013,536 filed December 12, 2003. [Pub. No.: US 2005/0214814 A1; Pub. Date: Sep. 29, 2005]

**DYER, ROBERT M.**, V.M.D., Ph.D., Associate Professor

*Discipline: Veterinary Medicine, Production Medicine, Large Animal Immunology*

*Research: Respiratory diseases of cattle and swine. Major interests include mechanisms of viral-bacterial synergy in the lung that predispose the virus-infected lung to secondary bacterial colonization and infection. Areas of work include viral inhibition of T lymphocyte function, direct inhibition of alveolar macrophage and neutrophil effector functions by respiratory viruses. Other areas of interest include mechanisms of the immune response that control Neospora caninum infection in bovines. Major area of interest is the role of cellular and humoral immunity in controlling the expression of Neospora caninum in asymptotically infected carriers.*

Vertical Limb Movement Variables, Locomotion Score and Compensatory Load Redistribution in Weight-Bearing Lameness of Dairy Cows R. M. Dyer<sup>‡</sup>, N. K. Neerchal<sup>†</sup>, U. Tasch<sup>§</sup>, Yukun Wu<sup>†</sup>, Dyer<sup>§</sup> P. G. Rajkondawar<sup>\*</sup> For J Dairy Science 2009.

Bovine Coronary Region Keratinocyte Colony Formation Is Supported By Epidermal-Dermal Interactions J. A. Mills<sup>‡</sup>, D.S. Zarlenga<sup>†</sup> and R.M. Dyer (in print, Journal of Dairy Science 10/09.

Tol Receptor Ligands Trigger Pro- and Anti-inflammatory Cytokine Expression in Keratinocyte-Fibroblast Co-Cultures of the Bovine Sensitive Lamina (J Dairy Science) MUTUAL GROWTH FACTOR AND CYTOKINE INDUCTION DURING BOVINE CORONETTE KERATINOCYTE AND FIBROBLAST INTERACTION, J Dairy Science 2008.

Enhancing the Prediction Accuracy of Bovine Lameness Models through Transformations of Limb Movement Variables. J. Liu, N. K. Neerchal, U. Tasch, R. M. Dyer, and P. G. Rajkondawar.

J. A. Mills, D.S. Zarlenga, P. Habecker, R.M. Dyer. Age, Region and Inflammation Affect Cytokine, Growth Factor and Receptor Expression in the Epidermis and Dermis of the Bovine Claw . (submitted J. Dairy Sci, 2008)

J. A. Mills, D.S. Zarlenga, R.M. Dyer. Corneete keratinocyte colony formation is supported by epidermal-dermal interactions in the bovine claw. (submitted J. Dairy Sci, 2008)

R. M. Dyer, N. K. Neerchal, U. Tasch, Yukon Wu, P. Dyer, P. G. Rajkondawar. Relationship of Locomotion Score to the Magnitude of Vertical Limb Movement Variables in Dairy Cows.

R.M. Dyer. Reproductive workshop for producers. TAI Programs, Conception Failure and Early Embryonic Death. Dover Delaware. 2007. Titles within this series included:

- Bovine Virus Diarrhea Virus and Infertility in Lactating Dairy Cattle: Control the Persistent Infection.
- Leptospira Infertility in Lactating Dairy Cattle: Control of the Persistent Infection
- The Role of Nutrition and Metabolic Controls in Subfertility of Lactating Dairy Cattle.
- Ovulation Synchronization and Fixed Time Artificial Insemination in Dairy Cows: Low Conception Rates and Poor Follicle Welfare.
- Sustaining Reproductive Fertility in Dairy Cattle: The Role of Artificial Insemination

R. M. Dyer, N. K. Neerchal, U. Tasch, Yukon Wu, P. Dyer, P. G. Rajkondawar. Objective Determination of Claw Pain and Its Relationship to Limb Locomotion Score in Dairy Cattle J Dairy Science 90: 4592-4602, 2007.

D. Zhang, D. Arola, R. Reprogel, W. Zheng, U. Tasch and R. M. Dyer, A Method for Characterizing the Mechanical Behaviour of Hoof Horn, Journal of Materials Sci, 42: 1108-1115, 2007.

P. G. Rajkondawar, M. Liu, R. M. Dyer, N. K. Neerchal, U. Tasch, A. M. Lefcourt, B. Erez, and M. A. Varner. Comparison of Models to Identify Lame Cows Based on Gait and Lesion Scores, and Limb Movement Variables J. Dairy Sci. 2006 89: 4267-4275.

J. A. Mills and R. M. Dyer, Keratinocyte stem cell expression is supported by epidermal-dermal cell interactions in the bovine sensitive lamina in vitro. Lameness in Ruminants, 14th International Symposium, November 8-11, 2006, Colonia, Uruguay,

**EMARA, MARLENE G., Ph.D., Associate Professor**

*Discipline: Avian Immunology*

*Research: The long-term goal of this laboratory is to identify genes that influence immune response and disease resistance of chickens to avian pathogens. Our laboratory is currently investigating the genetics of resistance to Marek's disease, an economically important disease of chickens that causes T cell cancer in birds. Collaborative studies are also underway to evaluate coccidiosis, a protozoan disease of the chicken intestinal tract. In the laboratory, there is an emphasis on the major histocompatibility complex, a gene complex whose products influence T lymphocyte function, as well as other chicken genes throughout the genome. We routinely use microsatellite DNA markers to*

Rev. October 2009

*genotype chickens and search for genes affecting immune response and disease resistance. In addition, we are focusing on a region of chicken chromosome 1 that appears to contain a chromosomal breakpoint (genetic mutation). Current research involves evaluating this mutation and its frequency in Marek's disease tumors.*

Emara, M. G. and H. S. Kurtas. Use of LEI0258 and MCW0371 microsatellite loci for genotyping MHC haplotypes in broiler chickens. Poultry Science journal – paper was reviewed and a revised manuscript with suggested additions was invited (see above).

Kim, S., and M.G. Emara. Identification and characterization of Chicken S-Phase Kinase Associated Protein 2 (SKP-2). Manuscript in preparation.

Kim, S., M. Parcels, and M.G. Emara. Evaluation of chicken P27Kip1 interaction with meq during MDV-induced transformation. Immunoprecipitation experiments need to be completed and manuscript completed.

Schmidt, R. J., M. G. Emara, and L. Kung, Jr. 2008. The use of a quantitative real-time polymerase chain reaction assay for identification and enumeration of *Lactobacillus buchneri* in silage. J. Applied Microbiol. 105:920-929.

Bliss, T. W., J. E. Dohms, M. G. Emara, and C. L. Keeler, Jr. 2005. Gene expression profiling of avian macrophage activation. Vet Immunol Immunopathol. 105:289-99.

**GELB, JACK, JR., Ph.D., Professor**

*Discipline: Avian Virology*

*Research: Respiratory disease viruses of poultry with emphasis on surveillance, diagnostics, pathogenesis, and control.*

Wood, M. K., B. S. Ladman, L. A. Preskenis, C. R. Pope, D. A. Bautista, and J. Gelb, Jr. Massachusetts Live Vaccination Protects Against A Novel S1 Genotype Infectious Bronchitis Virus DMV/5642/06. *Avian Diseases* 53:119-123. 2009.

Ammayappan, A., C. Upadhyay, J. Gelb, Jr., and V. N. Vakharia. Identification of sequence changes responsible for the attenuation of avian infectious bronchitis virus strain Arkansas DPI. *Archives of Virology* 154:495-499. 2009.

Gelb, J., Jr. and M. W. Jackwood. Infectious bronchitis. In: A Laboratory Manual for the Isolation, Identification, and Characterization of Avian Pathogens. L. Dufour-Zavala, D. E. Swayne, J. R. Glisson, J. E. Pearson, W. M. Reed, M. W. Jackwood, and P. R. Woolcock, eds. 5th edition. 2008.

Gelb, J., Jr. Avian infectious bronchitis. In: OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals; 6<sup>th</sup> ed. World Organization for Animal Health. pp. 443-455. 2008.

Cavanagh, D., and J. Gelb, Jr. Infectious bronchitis. In: Diseases of Poultry, 12<sup>th</sup> ed. Y. M. Saif, A. M. Fadly, J. R. Glisson, L. R. McDougald, L. K. Nolan, and D. E. Swayne, eds. Iowa State Univ. Press, Ames, Iowa. pp 117-135. 2008.

Ammayappan, A., C. Upadhyay, J. Gelb, Jr., and V. N. Vakharia. Complete genomic sequence analysis of infectious bronchitis virus Ark DPI strain and its evolution by recombination. *Virology Journal* 5:157. 2008.

Ladman, B. S., S. C. Rosenberger, J. K. Rosenberger, C. R. Pope, and J. Gelb, Jr. Virulence of low pathogenicity H7N2 avian influenza viruses from the Delmarva peninsula for broiler and leghorn chickens and turkeys. *Avian Diseases* 52:623-631. 2008.

Gelb, J., Jr., B. S. Ladman, M. J. Licata, M. H. Shapiro, and L. R. Champion. Evaluating Viral Interference between Infectious Bronchitis Virus and Newcastle Disease Virus Vaccine Strains Using Quantitative Reverse Transcription Polymerase Chain Reaction. *Avian Diseases* 51:924-934. 2007.

Ladman, Brian S., Alison B. Loupos, and Jack Gelb, Jr. Infectious bronchitis virus S1 gene sequence comparison is a better predictor of challenge of immunity in chickens than serotyping by virus neutralization. *Avian Pathology* 35:127-33. 2006.

Gelb, J., Jr., Y. Weisman, B. S. Ladman, and R. Meir. S1 gene characteristics and efficacy of vaccination against infectious bronchitis virus field Isolates from the United States and Israel (1996-2000). *Avian Pathology* 34:194-203. 2005.

Bayry, Jagadeesh, Mallikarjun S. Goudar, Prashant K. Nighot, Supriya G. Kshirsagar, Brian S. Ladman, Jack Gelb, Jr., Govind R. Ghalsasi, and Gopal N. Kolte. Emergence of a nephropathogenic avian infectious bronchitis virus with a novel genotype in India, *J. Clin. Microbiol.* 43:916-918. 2005.

**GOLOVAN, SERGUEI, Ph.D., Assistant Professor**

*Discipline: Molecular biology*

*Research: Recent epidemic in Asia and Canada have demonstrated that avian influenza (bird flu) not only results in significant monetary loss for the poultry industry, but also represents a serious risk of creating human pandemic. Together with Dr. E. Nagy (Pathobiology) we have been able to achieve inhibition of avian influenza virus up to 1000 fold in chicken CH-SAH cells and up to 106 fold in MDCK cells using shRNA constructs targeting highly conservative sites in NP and PA mRNAs of avian influenza. To improve efficiency in avian cells we have designed new microRNA based constructs with chicken promoters. Eventual goal is production of prophylactic RNAi based drugs which can be administered to poultry in aerosol form or in drinking water to provide transient protection during an outbreak. Long term goal is to produce poultry completely resistant to avian influenza infection by introducing shRNA construct into chicken genome expressed with constitutive or virus inducible promoters. Ability to manipulate gene expression with RNAi will also increase popularity of chicken as a model for developmental studies.*

Abrahamyan A., E. Nagy, S.P. Golovan. Human H1 promoter expressed short hairpin RNAs (shRNA) suppress avian influenza virus replication in chicken CH-SAH and canine MDCK cells. *Antiviral Research*. 2009. Accepted PMID: 19737578.

H. Hakimov, C. Verschoor, S. Walters, M. Gadish, C. Elsik, D.K.Y. Chiu, C.W. Forsberg and S.P. Golovan. Application of iTRAQ to catalogue the skeletal muscle proteome in pigs and assessment of muscle proteins affected by sex and diet dephytinization. *Proteomics*, 2009. Aug;9(16):4000-16.

M. Gadish, D. Chiu, C.W. Forsberg and S.P. Golovan. A Granular Hierarchical Approach to Biophysical and Biochemical Evaluations of Transgenic Modifications. IJCBS 2009 : The International Joint Conference on Bioinformatics, Systems Biology and Intelligent Computing. 2009. Peer reviewed. Accepted.

Golovan,S.P., Hakimov,H.A., Verschoor,C.P., Walters,S., Gadish,M., Elsik,C., Schenkel,F., Chiu,D.K.Y., and Forsberg,C.W. (2008). Analysis of Sus scrofa liver proteome and identification of proteins differentially expressed between genders, and conventional and genetically enhanced lines. *Comparative Biochemistry and Physiology D-Genomics & Proteomics* 3, 234-242.

Colley,A., Buhr,M., and Golovan,S.P. (2008). Single bovine sperm sex typing by amelogenin nested PCR. *Theriogenology*. Oct 1;70 (6):978-83.

Stewart,C.K., Li,J., and Golovan,S.P. (2008). Adverse effects induced by short hairpin RNA expression in porcine fetal fibroblasts. *Biochemical and Biophysical Research Communications*. 2008 May 23;370(1):113-7.

Kang,J.H., Hakimov,H., Ruiz,A., Friendship,R.M., Buhr,M., and Golovan,S.P. (2008). The negative effects of exogenous DNA binding on porcine spermatozoa are caused by removal of seminal fluid. *Theriogenology*. 2008 Nov;70(8):1288-96.

Golovan, S., C. Verschoor, T. Wright, C. Elsik, S. Walters, J.P. Phillips, J. Kelly, C. Forsberg, High throughput Omics-based Analytical Tools for Evaluating Food Safety: Genetically Modified Meat Products and other Novel Foods. In: *Food, Health and Biotechnology: Consumer and Social Issues in Canada's New Food and Health Product Industries*. Edited by N.M. Ries and J.J. Shelley. University of Victoria, B.C. 2007. 52 p. ISBN: 978-1-55058-355-7.

Murray,D., Meidinger,R.G., Golovan,S.P., Phillips,J.P., O'Halloran,I.P., Fan,M.Z., Hacker,R.R., and Forsberg,C.W. (2007). Transgene and mitochondrial DNA are indicators of efficient composting of transgenic pig carcasses. *Bioresource Technology* 98, 1795-1804.

C. W. Forsberg, S.P. Golovan, A. Ajakaiye, J. P. Phillips, R. G. Meidinger, M. Z. Fan, J. M. Kelly, and R. R. Hacker. Genetic opportunities to enhance sustainability of pork production in developing countries: a model for food animals. In: *Application of gene-based technologies for improving animal production and health in developing countries*, edited by H. P. S. Makkar and G. J. Viljoen, Springer / Kluwer, September 1 2005. 793 p. ISBN: 1-4020-3311-7.

**GRESSLEY, TANYA**, Ph.D., Assistant Professor

*Discipline: Ruminant Nutrition and Immunology*

*Research: To examine aspects of dairy cattle nutrition as they relate to cow health. Current projects include: measuring effect of feed supplements on white blood cell function, evaluating feed supplement effects on post-ruminal fermentation, and evaluating in vitro measures of cow health.*

Brickner, A. E., J. A. A. Pires, T. F. Gressley, and R. R. Grummer. 2009. Effects of abomasal lipid infusion on liver triglyceride accumulation and adipose lipolysis during fatty liver induction in dairy cows. *J. Dairy Sci.* 92:4954-4961.

Velasco, J. M., E. D. Reid, K. K. Fried, T. F. Gressley, R. L. Wallace, and G. E. Dahl. 2008. Short-day photoperiod increases milk yield in cows with a reduced dry period length. *J. Dairy Sci.* 91: 3467-3473

Mikolayunas, C. M., D. L. Thomas, G. E. Dahl, T. F. Gressley, and Y.M. Berger. 2008. Effect of prepartum photoperiod on milk production and prolactin concentration of dairy ewes. *J. Dairy Sci.* 91:85-90.

Rastani, R. R., N. Silva Del Rio, T. F. Gressley, G. E. Dahl, and R. R. Grummer. 2007. Effects of increasing milking frequency during the last 28 days of gestation on milk production, dry matter intake, and energy balance in dairy cows. *J. Dairy Sci.* 90: 1729-1739.

Gressley, T. F., and L. E. Armentano. 2007. Effects of low rumen degradable protein or abomasal fructan infusion on diet digestibility and urinary nitrogen excretion in lactating dairy cows. *J. Dairy Sci.* 90:1340-1353.

Gressley, T. F., S. M. Reynal, J. J. Olmos Colmenero, G. A. Broderick, and L. E. Armentano. 2006. Development of a tool to insert abomasal infusion lines into dairy cows. *J. Dairy Sci.* 89:3965-3967.

Gressley, T. F., and L. E. Armentano. 2005. Effect of abomasal pectin infusion on digestion and nitrogen balance in lactating dairy cows. *J. Dairy Sci.* 88:4028-4044.

Mikolayunas, C. M., D. L. Thomas, G. E. Dahl, T. F. Gressley, and Y.M. Berger. 2008. Effect of prepartum photoperiod on milk production and prolactin concentration of dairy ewes. *J. Dairy Sci.* 91:85-90.

Velasco, J. M., E. D. Reid, K. K. Fried, T. F. Gressley, R. L. Wallace, and G. E. Dahl. 2008. Short-day photoperiod increases milk yield in cows with a reduced dry period length. *J. Dairy Sci.* 91: 3467-3473.

**GRIFFITHS, LESA G.**, Ph.D. Professor and Associate Provost for International Programs  
Research: Assessment of student learning in international education

Chieffo L. and L. Griffiths. *Here to Stay: Increasing Acceptance of Short-term Study Abroad Programs.* (Ch 21) In *Practice and Research in Study Abroad.* Edited by R. Lewin. Routledge Press. (2009)

Chieffo L. and L. Griffiths. *LIFE Abroad: A Unique Model for Study Abroad.* *IIE Networker*, Fall 2006.

Gleason M., Chieffo L. and L. Griffiths. *Study Abroad and McNair Scholars: A Partnership for Success!* *IIE Network web publication.* 2005. <http://www.iienetwork.org/?p=71205>

**HOOVER, DALLAS G.**, Ph.D., Professor  
*Discipline: Food Microbiology*  
*Research: Food microbiology and food safety.*

Neetoo, H., M. Ye, H. Chen, R.D. Joerger, D.T. Hicks, and D.G. Hoover. 2008. *Int. J. Food Microbiol.* 122:8-15.

Black, E.P., P. Setlow, A.D. Hocking, C.M. Stewart, A.L. Kelly, and D.G. Hoover. 2007. Response of

Rev. October 2009

spores to high pressure processing. *Comp. Rev. Food Sci. Food Safety* In press.

Grove, S.F., A. Lee, T. Lewis, C.M. Stewart, H. Chen, and D.G. Hoover. 2006. Inactivation of Foodborne viruses of significance by high pressure and other processes. *J. Food Prot.* 69: 957-968.

Guan, D., R.D. Joerger, K.E. Kniel, K.R. Calci, D.T. Hicks, L.F. Pivarnik and D.G. Hoover. 2006. Effect of high hydrostatic pressure on four genotypes of F-specific RNA bacteriophages (f2, GA, Q. and SP). *J. Appl. Microbiol.* 102: 51-56.

Guan, D., H. Chen, E.Y. Ting, and D.G. Hoover. 2006. Inactivation of *Staphylococcus aureus* and *Escherichia coli* O157:H7 under isothermal-endpoint pressure conditions. *J. Food Engin.* 77(3):620-627.

Guan, D., K. Kniel, K.R. Calci, and D.G. Hoover. 2006. Response of four types of coliphages to high hydrostatic pressure. *Food Microbiol.* 23(6): 546-551.

Black, E., K. Koziol-Dube, D. Guan, D. Cortezzo, D.G. Hoover, and P. Setlow. 2005. Studies on the triggering of germination of *Bacillus subtilis* spores by action of high hydrostatic pressure on nutrient germinant receptors. *Appl. Environ. Microbiol.* 71: 5879-5887.

Chen, H., D. Guan and D.G. Hoover. 2005. Sensitivity of foodborne pathogens to high hydrostatic pressure. *J. Food Prot.* 69(1): 130-137.

Chen, H., D.G. Hoover, and D.H. Kingsley. 2005. Temperature and treatment time influence high hydrostatic pressure inactivation of feline calicivirus, a norovirus surrogate. *J. Food Prot.* 68(11): 2389-2394.

Guan, D., H. Chen, and D.G. Hoover. 2005. Inactivation of *Salmonella* Typhimurium DT 104 in UHT whole milk using high hydrostatic pressure. *Intl. J. Food Microbiol.* 104(2):145-153.

Kingsley, D.H., D. Guan, and D.G. Hoover. 2005. Hydrostatic pressure inactivation of hepatitis A virus in strawberry purees and sliced green onions. *J. Food Prot.* 68(8):1748-1751.

Patent: #6,110,516. Awarded 9/29/2000. Process for treating foods using saccharide esters and superatmospheric hydrostatic pressure. With C.M. Stewart, C.P. Dunne, and A. Sikes.

**JOERGER, ROLF.** *Ph.D., Associate Professor*

*Discipline: Microbial Genetics and Physiology*

*Research: Microbiological studies related to food production and food safety, with emphasis on poultry and poultry products. Use of molecular techniques for the detection of microbes. Study of the mechanisms by which microorganism impact food quality and safety.*

R. D. Joerger, Casey A. Sartori, and Kalmia E. Kniel. 2009. Comparison of genetic and physiological properties of *Salmonella enterica* isolates from chickens reveals one major difference between serovar Kentucky and other serovars: Response to acid. *Foodborne Pathogens and Disease.* 6(4):503-512

Haiqiang Chen, Hudaa Neetoo, Mu Ye, and Rolf D. Joerger. 2009. Differences in pressure tolerance of *Listeria monocytogenes* strains are not correlated with other stress tolerances and are not based on differences in CtsR. *Food Microbiology*. 26(4):404-408.

Rolf D. Joerger, Subramaniam Sabesan, Donna Visioli, Dave Urian, Melissa C. Joerger. 2009. Antimicrobial Activity of Chitosan Attached to Ethylene Copolymer Films. *Packaging Technology and Science*. 22(3):125-138

Hudaa Neetoo, Mu Ye, Haiqiang Chen, Rolf D. Joerger, Doris T. Hicks, Dallas G. Hoover. 2008. Use of nisin-coated plastic films to control *Listeria monocytogenes* on vacuum-packaged cold-smoked salmon. *International Journal of Food Microbiology*. 122:8-15

Higgins, J., Hohn, C., Hornor, S., Frana, M., Denver, M., and Joerger, R. 2007. Genotyping of *Escherichia coli* from environmental and animal samples. *J. Microbiol. Methods*.  
Doi:10.1016/j.jmimet.2007.04.009

Joerger, R. D. 2007. Antimicrobial films for food applications: an analysis of quantitative results. *Packaging Science and Technology*. Published Online: 24 Apr 2007 DOI: 10.1002/pts.774

Guan D, Joerger RD, Kniel KE, Calci KR, Hicks DT, Pivarnik LF and Hoover DG. 2006. Effect of high hydrostatic pressure on four genotypes of F-specific RNA bacteriophages (f2, GA, Q $\beta$  and SP) *J. Applied Microbiology*. In press.

Joerger, R. D, H. Chen, and K. E. Kniel. 2006. Characterization of a spontaneous, pressure-tolerant *Listeria monocytogenes* Scott A ctsR deletion mutant. *Foodborne Pathogens & Disease*. 3:196-202.

Joerger, R. D. and T. Ross. 2005. Genotypic diversity of *Escherichia coli* isolated from cecal content and mucosa of one- to six-week-old broilers. *Poult. Sci*. 84:1902-1907.

**KEELER, CALVIN L., JR, Ph.D., Professor**

*Discipline: Molecular Genetics, Virology, Avian Diseases*

*Research: Although there is a great need to understand better the involvement of mucosal immunity in disease protection in all animal systems, that holds especially true in the avian system due to the high cost of respiratory disease. Infectious laryngotracheitis (ILT) is a herpesvirus induced acute respiratory disease of world-wide importance to the poultry industry. The primary focus of this laboratory is to understand the molecular basis of infectious laryngotracheitis virus (ILTV) pathogenicity and immunity. This is based on the belief that one aspect of a rational approach to the control of viral infections require an understanding of the host's immune response to infections with the virus, the identification of viral antigens responsible for eliciting that response, and the mechanisms of their interactions with the immune system. Using ILTV as a model, we hope to enhance our understanding of nononcogenic viral immunity in the avian system. Our group is also involved in evaluating the biological function of ILTV structural glycoproteins and is developing novel poultry viral vaccines and vectors. We envision ILTV as a candidate vector which will target antigens to the upper respiratory tract and which may be particularly well suited to heightening the host's cell-mediated immune response.*

Kim, D.K., Kim, C.H., Lamont, S.J., Keeler, C.L. and H.S. Lillehoj. (2009) Gene expression profiles of two B-complex disparate, genetically inbred Fayoumi chicken lines that differ in susceptibility to *Eimeria maxima*. Poultry Science 88:1565-1579.

Kim, C.H., H.S. Lillehoj, T.W. Bliss, C.L. Keeler, Y.H. Hong, D.W. Park, M. Yamage, W. Min and E.P. Lillehoj. (2008) Construction and application of an avian intestinal intraepithelial lymphocyte cDNA microarray (AVIELA) for gene expression profiling during *Eimeria maxima* infection. Veterinary Immunology and Immunopathology. 124:341-354.

Lavric, M., M.N. Maughan, T.W. Bliss, J.E. Dohms, D. Bencina, C.L. Keeler, Jr. and M. Narat. (2008) Gene expression modulation of chicken macrophages infected by *Mycoplasma synoviae* or *Escherichia coli*. Veterinary Microbiology 126:111-121.

Lillehoj, H.S., C.L. Keeler, Jr. and C.-H. Kim. (2007) Immunogenomics approach to study host innate immunity against intestinal parasites. Poultry Science. 86:1491-1500.

Keeler, C.L., Jr., T.W. Bliss, M. Lavric and M.N. Maughan. (2007) A functional genomics approach to the study of avian innate immunity Cytogenetic and Genome Research. 117:139-145.

Dalloul, R.A., T.W. Bliss, Y.-H. Hung, I. Ben-Chouikha, D.W. Park, C.L. Keeler, Jr. and H.S. Lillehoj. (2007) Unique responses of the avian macrophage to different species of *Eimeria*. Molecular Immunology 44:558-566.

Thureen, D.R. and C. L. Keeler, Jr. (2006) Psittacid herpesvirus 1 and infectious laryngotracheitis virus: Comparative analysis of two avian alphaherpesviruses. Journal of Virology. 80:7863-7872.

Bliss, T.W., J.E. Dohms, M.G. Emara and C.L. Keeler, Jr. (2005) Gene expression profiling of avian macrophage activation. Veterinary Immunology and Immunopathology 105:289-299.

**KNIEL, KALMIA E., Ph.D., Assistant Professor**

*Discipline: Food Microbiology; Food Virology and Parasitology*

*Research: Dr. Kniel is a food microbiologist who specializes in virology and parasitology. Her research concentrates on pathogens that contaminate fruits and vegetables. She has conducted research with waterborne and foodborne viruses, protozoa, and bacteria. Much of her work has involved studies analyzing non-thermal treatments as alternatives to traditional pasteurization technologies with protozoan parasites such as *Cryptosporidium parvum* and *Cyclospora cayetanensis*. Dr. Kniel's virology work has included determinations of viable and inactivated virions. The work with viruses began at the USDA Animal Parasitic Diseases Laboratory where she first used raccoon pox virus as a surrogate for smallpox to study survival along with the development of rapid detection assays. She has received funding from the USDA-National Research Initiative and the College of Agriculture and Natural Resources, University of Delaware to study the inactivation of human viruses in foods using high pressure, ultraviolet light, and ozone. She has expertise in mammalian cell culture and has optimized cell culture infection assays for studying protozoa and viruses.*

Solomon, E.B., Fino V., Wei J., Kniel, K.E. Comparative susceptibilities of hepatitis A virus, feline calicivirus, bacteriophage MS2 and bacteriophage PhiX-174 to inactivation by quaternary ammonium and oxidative disinfectants. Int J Antimicrob Agents. Epub 2008 Dec 17.

Fino, V.R., and Kniel, K.E. Comparative recovery of foodborne viruses from fresh produce. *Foodborne Path. Dis.* 2008. 5:1-7.

Fino, V.R., and Kniel, K.E. Ultraviolet Light Inactivation of Hepatitis A Virus, Aichi Virus, and Feline Calicivirus on Strawberries, Green Onions, and Lettuce. *J. Food Protect.* 2008. 71:908-913.

Jenkins, M.C., Higgins, J., Abrahante, J.E., Kniel, K.E., O'Brien, C., Trout, J., Lancto, C.A., Abrahamsen, M.S., Fayer, R. Fecundity of *Cryptosporidium parvum* is correlated with intracellular levels of the viral symbiont CPV. *Int J Parasitol.* 2008 Jul;38(8-9):1051-5.

Sharma, M., Shearer, A.E.H., Hoover, D.G., Liu, M.N., Solomon, M.B., Kniel, K.E. Comparison of hydrostatic and hydrodynamic pressure to inactivate foodborne viruses. *Innovative Food Science and Emerging Technologies*, 9 (4), p.418-422, Oct 2008

Shearer, A.E.H. and Kniel, K.E. High-hydrostatic Pressure for Vaccine Development. *J. Food Prot.*

J.L. Cascarino, E.P. Black, D. Guan, D.G. Hoover, D.T. Hicks, L.F. Pivarnik, and K.E. Kniel. Coliphage as pressure surrogates for enteric viruses in foods. *Innovative Food Sci. Emerg. Tech.*

Black, E., Hirneisen, K., Hoover, D., Kniel, K. Fate of *E. coli* O157:H7 in ground beef following high pressure processing and freezing. *J. Applied Micro.*

Kniel, K.E., Shearer, A.E.H., Cascarino, J.L., Wilkins, G.C., and Jenkins, M.C. High hydrostatic pressure and ultraviolet light treatment of produce contaminated with *Eimeria acervulina* as a *Cyclospora cayetanensis* surrogate. 2007. *J. Food Protection*. Submitted.

Sharma, M., Kniel, K.E., Derevianko, A., Ling, J., and Bhagwat, A.A. Sensitivity of *Escherichia albertii*, a potential foodborne pathogen, to food preservation treatments. *Appl. Environ. Micro.* 2007. 8:259-268.

Shearer, A.E.H, Wilkins, G.C., Jenkins, M.J., Kniel, K.E. Effects of High Hydrostatic Pressure on *Eimeria acervulina* Pathogenicity, Immunogenicity and Structural Integrity. *Innovative Food Science and Emerging Technologies*. 2007. 8:259-268.

Kniel, K. Rapid diagnostic methods in food safety: protozoa & parasites. *Wiley Encyclopedia of Biotechnology*. 2007. In Press

Guan, D., Joerger, R., Kniel, K., Calci, K.R., Hicks, D.T., Pivarnik, L.F., Hoover, D.G. Effect of high hydrostatic pressure on four genotypes of F-specific RNA bacteriophages. *J. Applied Microbiology*. 2007. 102(1): 51-6.

Guan, D., Joerger, R., Kniel, K., Calci, K.R., Hicks, D.T., Pivarnik, L.F., Hoover, D.G. Response of four types of coliphages to high hydrostatic pressure. *Food Microbiology*. 2006. 23:546-551.

Joerger, R., Chen, H., Kniel, K. Characterization of a spontaneous, pressure-tolerant *Listeria monocytogenes* Scott A *ctsR* deletion mutant. *Foodborne Path. Dis.* 2006. 3(2):196-202.

Kniel, K.E. Survival of racoonpox virus in water. In J.A. Higgins (author), "Threat agents and water biosecurity." 2005. J. Wiley Encyclopedia of Water.

Kniel, K.E. and Jenkins, M.C. Detection of *Cryptosporidium parvum* oocysts on fresh vegetables and herbs using antibodies specific for a *C. parvum* viral antigen. J. Food Prot. 2005. 68(5): 1093-1096.

Kniel, K.E., Sumner, S.S., Golden, D.A. Lindsay, D.S., Hackney, C.R., Pierson, M.D., Zajac, A.M., and Fayer, R. Effect of Effect of Ozone Treatment on *Cryptosporidium parvum* Viability in Fruit Juices. Foodbrn. Path. Dis. 2005

Patent: Kniel, K.E. and Jenkins, M.C. 2003. A Sensitive Antibody-Based Method for Detecting *Cryptosporidium parvum* Oocysts in Water. USDA-ARS, S.N. 10/863,939.

**KUNG, LIMIN, JR, Ph.D., Professor**

*Discipline: Dairy Cattle (Ruminant) Nutrition and Microbiology*

*Research: Ruminants are fascinating animals because microorganisms in their gut provide them with a significant amount of nutrients. My lab focuses on improving the efficiency of milk and meat production by ruminants by manipulating forage quality and/or by improving rumen fermentation. Research is based on using a combination of techniques in biochemistry, microbiology and nutrition. Major research areas include using novel bacteria to prevent the growth of yeasts and molds in silages and altering rumen fermentation. Collaborative research is currently using PCR technology to help with identification of microorganisms.*

Schmidt, R. J., M. Emara and L. Kung, Jr. 2008. The use of a quantitative real-time polymerase chain reaction assay for identification and enumeration of *Lactobacillus buchneri* in silages. J. Appl. Micro. 105:920–929.

Kung, Jr., L., P. Williams, R. J. Schmidt, and W. Hu. 2008. A blend of essential plant oils used as an additive to alter silage fermentation or used as a feed additive for lactating dairy cows. J. Dairy Sci. 91: 4793-4800.

Kung, Jr., L., B. M. Moulder, C. M. Mulrooney, R. S. Teller and R. J. Schmidt. 2008. The effect of silage cutting height on the nutritive value of a normal corn silage hybrid compared to brown midrib corn silage fed to lactating cows. J. Dairy Sci. 91: 1451-1457.

Klingerman, C. M., W. Hu, E. E. McDonell, M. C. DerBedrosian, and L. Kung, Jr. 2009. An evaluation of exogenous enzymes with amylolytic activity for dairy cows. J. Dairy Sci. 92: 1050-1059.

Mari, L. J., R. J. Schmidt, L. G. Nussio, C. M. Hallada, and L. Kung, Jr. 2009. An evaluation of the effectiveness of *Lactobacillus buchneri* 40788 to alter fermentation and improve the aerobic stability of corn silage in farm silos. J. Dairy Sci. 92: 1174-1176.

Hu, W. R. J. Schmidt, E. E. McDonell, C. M. Klingerman, L. Kung, Jr. 2009. The effect of *Lactobacillus buchneri* 40788 or *Lactobacillus plantarum* mtd-1 on the fermentation and aerobic stability of corn silages ensiled at two dry matter contents. J. Dairy Sci. Accepted March 2009.

Kung, Jr., L., B. M. Moulder, C. M. Mulrooney, R. S. Teller and R. J. Schmidt. 2008. The effect of silage cutting height on the nutritive value of a normal corn silage hybrid compared to brown midrib corn silage fed to lactating cows. Accepted Nov, 2007. J. Dairy Sci. In press.

Mulrooney, C. N., and L. Kung, Jr. 2008. The effect of water temperature on the viability of silage inoculants. J. Dairy Sci. J. Dairy Sci. 91:236–240.

Schmidt R. J., M. Emara, and L. Kung Jr. 2008. The use of a quantitative real-time polymerase chain reaction assay for identification and enumeration of *Lactobacillus buchneri* in silages. Accepted Dec., 2007.

Kizilsimsek, M., R. J. Schmidt, and L. Kung, Jr. 2007. Effects of a mixture of lactic acid bacteria applied as a freeze dried or fresh culture on the fermentation of alfalfa silage. In press J. Dairy Sci. 90:5698–5705.

Reddish, M. A., and L. Kung, Jr. 2007. The effect of feeding a dry enzyme mixture with fibrolytic activity on the performance of lactating cows and digestibility of a diet for sheep. J. Dairy Sci. 90:4724–4729.

Hu, Wenping, Limin Kung Jr., and Michael R. Murphy. 2007. Relationships between dry matter intake and acid–base status of lactating dairy cows as manipulated by dietary cation–anion difference. Anim. Feed Sci. Technol. 136:216-225

Kung, L., Jr., R. J. Schmidt, T. E. Ebling and W. Hu. 2007. The effect of *Lactobacillus buchneri* 40788 on the fermentation and aerobic stability of ground and whole high moisture corn. J. Dairy Sci. 90:2309-2314.

Kleinschmit, D. H. and L. Kung, Jr. 2006. A meta-analysis of the effects of *Lactobacillus buchneri* on the fermentation and aerobic stability of corn, grass and small grain silages. J. Dairy Sci. 89: 4005-4013.

Kleinschmit, D. H. and L. Kung, Jr. 2006. The effects of *Lactobacillus buchneri* 40788 and *Pediococcus pentosaceus* R1094 on the fermentation of corn silage during various stages of ensiling. J. Dairy Sci. 89: 3999-4004.

Kleinschmit, D. H., R. J. Schmidt, and L. Kung, Jr. 2005. The effects of various antifungal additives on the fermentation and aerobic stability of corn silage. J. Dairy Sci. 88:2130-2139.

**MORGAN, ROBIN W.**, Ph.D., Dean, Professor,

*Discipline: Molecular Biology*

*Research: Our interests center on the molecular biology of Marek's disease virus, a herpesvirus that causes infectious T-cell lymphomas in chickens. Specific research projects include understanding the molecular mechanisms that lead to transformation of T-cells by Marek's disease virus, examining the immunological responses that result in vaccine- Induced protection from lymphoma formation, and developing vaccines to control Marek's disease. Microarray technology is being used to understand host responses to infection.*

Waidner, L., R. Morgan, A. Anderson, E. Bernberg, S. Kamboj, M. Garcia, S. Riblet, M. Ouyang, G. Isaacs, M. Markis, B. Meyers, P. Green, and J. Burnside. Novel ILTV and HVT microRNAs have conserved genomic locations with those of other Gallid and Meleagrid herpesvirus microRNAs. 2009. Virology under review.

Morgan, R., A. Anderson, E. Bernberg, S. Kamboj, E. Huang, G. Lagasse, G. Isaacs, M. Parcels, B. C. Meyers, P. J. Green, and J. Burnside. 2008. Sequence conservation and differential expression of Marek's disease virus microRNAs. J. Virology 82:12213-12220.

Burnside, J., M. Ouyang, A. Anderson, E. Bernberg, C. Lu, B. C. Meyers, P. J. Green, M. Markis, G. K. Isaacs, E. Huang, and R. W. Morgan (2008) Deep sequencing of chicken microRNAs. BMC Genomics 9:185.

Niikura, Masahiro, T. Kim, H. D. Hunt, J. Burnside, R. W. Morgan, J. D. Dodgson, and H. Cheng (2007) Marek's disease virus up-regulates major histocompatibility complex class II cell surface expression in infected cells. Virology 359: 212-219.

Burnside, Joan and R. W. Morgan. 2007. Genomics and Marek's disease in: Cytogenetics and Genome Research, S. Karger. Vol. 17, pp 376-387.

Carre, W., X. Wang, T.E. Porter, Y. Nys, J. Tang, E.L. Bernberg, R.W. Morgan, J. Burnside, S.E. Aggrey, J. Simon, and L.A. Cogburn. 2006. Chicken genomics resource: sequencing and annotation of 35,407 ESTs from single and multiple tissue cDNA libraries and CAP3 assembly of a chicken gene index. Physiological Genomics 25:514-524.

Burnside, Joan, E. Bernberg, A. Anderson, C. Lu, B. Meyers, P. Green, N. Jain, G. Isaacs, and R. Morgan (2006) Marek's disease virus encodes microRNAs that map to meq and the latency-associated transcript. J. Virology 80:8778-8786.

**PARCELLS, MARK, Ph.D., Associate Professor**

*Discipline: Molecular Virology*

*Research: Dr. Parcels' research is focused on Marek's disease virus (MDV), a lymphoma-causing herpesvirus of chickens. Dr. Parcels' uses molecular biological as well as cell culture, immunological, genomic and bioimaging techniques to study the functions of MDV gene products. The two main emphases of his research are identifying the mechanisms contributing to cellular transformation by MDV and determining the means by which MDV strains evolve in the field to become more virulent. MDV represents a powerful model for the study of lymphoma development and progression and lessons learned from MDV may provide insight into the control of human malignancies such as Hodgkin's lymphoma. Since MDV has evolved in the field in the face of vaccines that prevent tumor formation, understanding how these field strains persist and overcome vaccine-induced immunity may provide insight into future vaccine development.*

Tavlarides-Hontz, P., P. M. Kumar, J. R. Amortegui, N. Osterrieder, and M. S. Parcels. 2009. A deletion within glycoprotein L of Marek's disease virus (MDV) field isolates correlates with a decrease in bivalent MDV vaccine efficacy in contact-exposed chickens. Avian Dis.53:287-296.

Arumugaswami, V., P. M. Kumar, V. Konjufca, R. L. Dienglewicz, S. M. Reddy and M. S. Parcels. 2009. Latency of Marek's Disease Virus (MDV) in a Reticuloendotheliosis Virus-Transformed T-cell Line. I: Uptake and Structure of the Latent MDV Genome. *Avian Dis.* 53:149-155.

Arumugaswami, V., P. M. Kumar, V. Konjufca, R. L. Dienglewicz, S. M. Reddy and M. S. Parcels. 2009. Latency of Marek's Disease Virus (MDV) in a Reticuloendotheliosis Virus-Transformed T-cell Line. II: Expression of the Latent MDV Genome. *Avian Dis.* 53:156-165.

McCarthy, F. M., T. J. Mahony, M. S. Parcels, and S. C. Burgess. 2009. Understanding Animal Viruses Using the Gene Ontology and AgBase. *Trends in Microbiology*, July 2 ePub (ahead of printed article).

Morgan, R. W., A. Anderson, E. Bernberg, S. Kamboj, E. Huang, G. Lagasse, G. Isaacs, M. Parcels, B.C. Myers, P. J. Green, and J. Burnside. 2008. Sequence Conservation and Differential Expression of Marek's Disease Virus microRNAs. *J. Virol.* 82:12213-12220.

Parcels, M.S. and S. C. Burgess. 2008. Immunological Aspects of Marek's Disease Virus (MDV) Induced Lymphoma Progression. In: *Selected Aspects of Cancer Progression: Metastasis, Apoptosis, and Immune Response*. H. E. Kaiser, ed., Springer, the Netherlands, p. 169-191.

Santin, E., C.E. Shamblin, J. T. Prigge, V. Arumugaswami, R. L. Dienglewicz and M.S. Parcels. 2006. Examination of a Naturally-occurring Mutation in Glycoprotein L (gL) on Marek's Disease Virus Pathogenesis. *Avian Dis.* 50:96-103.

Trapp, S., M.S. Parcels, J.P. Kamil, D. Schumacher, B. K. Tischer, P. M. Kumar, V. K. Nair, and N. Osterrieder. 2006. A virus-encoded telomerase RNA promotes malignant T cell lymphomagenesis. *J. Exp. Med.* 203:1307-1317.

Anobile, J., V. Arumugaswami, D. Downs, K. Czymmeck, M. S. Parcels and C. J. Schmidt. 2006. Nuclear Localization and Dynamic Properties of the Marek's Disease Virus Oncogene Products Meq and Meq/vL8. *J. Virol* 80:1160-1166.

Parcels, M.S. and S. C. Burgess. 2005. Immunological Aspects of Neoplastic Progression in Marek's Disease. Chapter 14, in Vol. 5 of *Cancer Growth and Progression*. Dr. Hans E. Kaiser, ed. Kulwer Academic Publishing, Dordrecht, The Netherlands, in press.

**POPE, CONRAD R**, DVM, MS, Public Service Faculty, Professor

*Discipline: Veterinary Pathology and Histology. Emphasis on avian disease histopathology and avian histology.*

*Research: Histopathology of avian infectious diseases with emphasis on the lymphoid system and diagnostic avian histopathology.*

Wood, M. K., B. S. Ladman, L. A. Preskenis, C. R. Pope, D. A. Bautista, and J. Gelb, Jr. Massachusetts Live Vaccination Protects Against A Novel S1 Genotype Infectious Bronchitis Virus DMV/5642/06. *Avian Diseases* 53:119-123. 2009.

Ladman, B. S., S. C. Rosenberger, J. K. Rosenberger, C. R. Pope, and J. Gelb, Jr. Virulence of low pathogenicity H7N2 avian influenza viruses from the Delmarva peninsula for broiler and leghorn chickens and turkeys. *Avian Diseases* 52:623-631. 2008.

**SAYLOR, WILLIAM W., PhD, Professor**

*Discipline: Poultry Nutrition*

*Research: Nutritional Strategies to Minimize Environmental Impact of Poultry Production. We are investigating the use of numerous dietary modifications to reduce the impact of animal production, especially poultry production, on soil and water quality. Specifically, we are looking for ways to change dietary nutrient concentrations or improve nutrient utilization to minimize excretion of those nutrients into the environment. Our target nutrient at this time is phosphorous, and we are looking for methods to enhance the utilization of dietary phosphorous in poultry so that the excretion of undigested phosphorous is minimized. We are also investigating nitrogen and sulfur metabolism, utilization and excretion. In another area, we are developing a scheme for evaluating xenobiotic metabolism using an embryonating egg as a model system.*

Saylor, W. W., N. E. Ward and R. Angel. 2009, Intermittent lighting affects efficacy of phytases differently. *Poult. Sci.* 88 (Supple. 1): 34.

McGrath, J.M., J. T. Sims, R. O. Maguire, W. W. Saylor and R. Angel. 2009. Modifying broiler diets with phytase and vitamin D metabolite (25-OH D<sub>3</sub>): Impact on phosphorus in litter, amended soils and runoff. *J. Environ. Qual.* (accepted).

Schmidt, C. J., M. E. Persia, E. Feierstein, B. Kingham and W. W. Saylor. 2009. Comparison of a modern broiler and a heritage line unselected since the 1950's. *Poult. Sci.* (In review)

Persia, M. E., J. E. Eaton and W. W. Saylor. 2009. Effects of over-processing soybean meal on phosphorus utilization in broiler chicks. *Poult. Sci.* (Submitted).

Timmons, J. R., R. Angel, J. M. Harter-Dennis, W. W. Saylor and N. E. Ward. 2008. Efficacy of heat stable phytase on broiler performance and bone ash. *Abstr. 23<sup>rd</sup> World Poultry Congress, June 30 – July 4, 2008.* P. 354.

Timmons, J.R., R. Angel, J. M. Harter-Dennis, W. W. Saylor, and N. E. Ward, 2008. Evaluation of heat-stable phytases in pelleted diets from day zero to thirty-five during the summer months. *J. Appl. Poult. Res.* 17:482-489.

Mullins, T. M., P. T. Luu and W. W. Saylor. 2007. Embryonic development of the cardiovascular system, hemopoiesis, and the Bursa of Fabricius in a hypoxic incubation environment. *Poultry Sci.* (accepted).

Mullins, T. M. and W. W. Saylor. 2007. Right ventricular disease and ascites formation in response to embryonic hypoxia in broilers fed a high-fat diet. *Poultry Sci.* (accepted).

Hester, P. Y., C. Z. Alvarado, S. F. Bilgili, J. H. Denton, A. M. Donoghue, A. Giesen, B. M. Hargis, J. W. Kessler, F. N. Madison, G. W. Malone, P. Mavrolas, S. L. Noll, A. J. Pescatore, C. A. Ricks, F. E. Robinson, R. B. Shirley, M. Sifri, M. O. Smith, R. H. Stonerock, J. L. Wilson, M. J. Wineland, M. M. Beck, and W. W. Saylor. 2006. The 2006 – 2010 Strategic Plan for the

Poultry Science Association. Poultry Sci. 85:1-7.

Persia, M. E. and W. W. Saylor. 2006. Effect of broiler strain, dietary phosphorus and phytase supplementation on chick performance and tibia ash. J. Appl. Poultry Res. 15:72-81.

Angel, R., W. W. Saylor, A.D. Mitchell, W. Powers and T. J. Applegate. 2006. Effect of dietary phosphorus, phytase and 25-hydroxycholecalciferol on broiler chicken bone mineralization, litter phosphorus, and processing yields. Poultry Sci. 85:1200-1211.

Persia, M.E., and W. W. Saylor. 2006. Effect of Heat Processing on the Phosphorus Quality of Soybean Meal. FeedInfo News Service Scientific Reviews. March 2006. Available from URL: <http://www.feedinof.com>

Hester, P.Y., C. Z. Alvarado, S. F. Bilgili, J. H. Denton, A. M. Donoghue, A. Giesen, B. M. Hargis, J. W. Kessler, F. N. Madison, G. W. Malone, P. Mavrolas, S. L. Noll, A. J. Pescatore, C. A. Ricks, F. E. Robinson, R. B. Shirley, M. Sifri, M. O. Smith, R. H. Stonerock, J. L. Wilson, M. J. Wineland, M. M. Beck, and W. W. Saylor. 2005. Planning our future: The Poultry Science Association Strategic Plan. Poultry Sci. 84:814-815.

Angel, R., W. W. Saylor, T. J. Applegate, and W. Powers, A. S. Dhandu. 2005. Effect of dietary phosphorus, phytase, and 25-hydroxycholecalciferol on performance of broiler chicks grown in floor pens. Poultry Sci. (in press).

McGrath, J. M., J. T. Sims, R. O Maguire, W. W. Saylor, C. R. Angel and B. L. Turner. 2005. Broiler diet modification and litter storage: Impacts on phosphorus in litters, soils, and runoff. J. Environ. Quality. (in press).

Applegate, T. J., J.T. Sims, W. Saylor, J. McGrath, W. Powers, and R. Angel. 2005. Phytase in Poultry Diets: Further evidence for reducing water-soluble phosphorus in the environment. Proc. of the Multi-State Poultry Conference. May 24-26, 2005.

Hansen, D., J. Nelson, G. Binford, T. Sims and W. Saylor. 2005. Phosphorus in poultry litter: New guidelines from the University of Delaware. Coll. Agric. Nat. Res. Bull. NM-07. June 21, 2005

**SCHMIDT, CARL J., Ph.D., Assistant Professor**

*Discipline: Molecular Biology*

*Research: Molecular biology of oncogenic avian viruses. DNA chip technology is being used to understand the responses of host cells to infection by these viruses. In addition, we are studying the role of specific virus proteins using a variety of methods including the yeast two hybrid system and confocal microscopy.*

Schmidt, C.J., M.E. Persia, E. Feierstein, B. Kingham W.W. Saylor (2009). Comparison of a Modern Broiler Line and a Heritage Line Unselected Since the 1950's. Poultry Science. In press.

Burt, David W, Wilfrid Carré, Mark Fell, Andy S Law, Parker B Antin, Donna R Maglott, Janet A Weber, Carl J Schmidt, Shane C Burgess, Fiona M McCarthy (2009) The chicken gene nomenclature committee report. BMC Genomics doi:10.1186/1471-2164-10-S2-S5.

Schmidt, Carl J., Michael Romanov, Oliver Ryder, Vincent Magrini, Matthew Hickenbotham, Jarret Glasscock, Sean McGrath, Elaine Mardis, and Lincoln D. Stein (2008) Gallus GBrowse: a unified genomic database for the chicken. *Nucleic Acids Res.* 2008 January; 36(Database issue): D719–D723.

Tudor, Catalina O, Carl J Schmidt, and K Vijay-Shanker, Mining for Gene-Related Key Terms: Where Do We Find Them?, Third International Symposium on Semantic Mining in Biomedicine SMBM 2008, Turku Finland, September 2008, 157-160.

Tudor, Catalina O, K Vijay-Shanker, and Carl J Schmidt, Mining the Biomedical Literature for Genic Information, BioNLP Workshop in conjunction with ACL-2008, Columbus Ohio, June 2008, 28-29.

Anobile, J., Arumugaswami, V., Downs, D., Czymmek, K., Parcels, M., and Schmidt, C.J. (2006) Nuclear Localization and Dynamic Properties of the Marek's Disease Virus Oncogene Products Meq and Meq-vIL8. *J. Virology* 80 1160-1166.

Jin, L., Steiner, K., Schmidt, C.J., Situ, G., Kamboj, S. Kay T. Hlaing, Morgan Conner, Heebal Kim, Marlene Emara, and Keith S. Decker (2005) "A Multiagent Framework to Integrate and Visualize Gene Expression Information" IEEE-ICDM Workshop on Multiagent Data Warehousing and Multiagent Data Mining, pp. 1-7.

**SNIDER, O. SUE**, Ph.D., Professor and Extension Food Safety and Nutrition Specialist  
*Discipline: Food Safety and Nutrition*

Carl K. Winter, Angela M. Fraser, Jeanne B. Gleason, Susan K. Hovey, Sandra M. McCurdy, and O. Sue Snider Food safety education using music parodies– in publication.

Schmidt, J., Vickery, C.E., Cotugna, N.A., Snider, O.S. 2005. Health Professionals Hold Positive Attitudes Toward Biotechnology and Genetically Engineered Foods. *J. Environ. Health* 67(10):44.

*Delaware Cooperative Extension Fact Sheets:*  
Apostolou, M. and Snider, S. 2003. Fats.

Snider, S. 2003. Fiber.

Snider, S. 2003. It's Safe Food: Keep it Safe.

Snider, S. 2003. Using Herbs and Spices.

Snider, S. 2001. Keep Food Safe – It's In Your Hands!

**CHANGQING, WU**, Ph.D., Assistant Professor

*Discipline: Food Toxicology, Nutraceutical and Food Safety*

*Research: Current research focuses on: Separation and identification of bioactive compounds from foods, spices or medicinal herbs using column chromatography techniques, HPLC/PDA, LC/MS,*

Rev. October 2009

*GC/MS, and NMR analysis; Assessments of bioactivities of nutraceuticals and functional foods using antimicrobial tests, cell cultures, and antioxidant assays; Synergistic or antagonistic effects of bioactive compounds; Impact of bioactive compounds on obesity and heart disease.*

Wu, C., Duckett, S., Neel, P. S., Fontenot, J. P., Clapham, W.M. (2008). Influence of Finishing Systems on Hydrophilic and Lipophilic Oxygen Radical Absorbance Capacity (ORAC) in Beef. *Meat Science* (in press). Published online March 14, 2008.

Shao Y., He Y., Wu C. (2008). Dose Detection of Radiated Rice by Infrared Spectroscopy and Chemometrics. *J. Agricultural and Food Chemistry*, 56, 3960-3965

Wu, C., Chen, F., Wang, X., Wu, Y., Dong, M., He, G., Galyean, R., He, L., Huang, G. (2007). Identification of Antioxidant Phenolic Compounds in Feverfew (*Tanacetum parthenium*) by HPLC-ESI-MS/MS and NMR. *Phytochemical Analysis*, 18, 401-410.

Li, X., He, Y., Wu, C. Discrimination of the Paddy Seeds with Different Storage Periods based on Vis/NIR Spectroscopy. *J. Stored Product* (in press).

Li, X., He, Y., Wu, C., Sun, D. (2007). Nondestructive Measurement and Fingerprint Analysis of Soluble Solid Content of Tea Soft Drink based on Vis/NIR Spectroscopy. *Food Engineering*, 82, 316-323.

Wu, C., Chen, F., Wang, X., Kim, H-J., He, G, Haley-Zitlin, V., Huang, G. (2006). Antioxidant Constituents in Feverfew (*Tanacetum parthenium*) Extract and Their Chromatographic Quantification. *Food Chemistry*, 96, 220-227.

Wu, C., Chen, F., Rushing, J., Wang, X., Kim, H-J., Huang, G., Haley-Zitlin, V., He, G. (2006). Antiproliferative Activities of Parthenolide and Golden Feverfew Extract against Three Human Cancer Cell Lines. *J. Medicinal Food*, 9, 55-61.