

# Richard S. Gates

Iowa State University

Departments of Agricultural and Biological Engineering, and Animal Science

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## Education

Ph.D.	Biological Engineering, Cornell University	1984
M.S.	Agricultural Engineering, Cornell University	1980
B.S.	Agricultural Engineering, University of Minnesota	1978

## Professional Experience

Professor, Departments of Agricultural and Biosystems Engineering and Animal Science, and Director, Egg Industry Center, Iowa State University	2020-present
Professor, Agricultural and Biological Engineering, University of Illinois at Urbana-Champaign	2008-2019
Graduate Faculty, Faculty of Agric. Engineering, Federal University of Viçosa	2001-present
Chair, Biosystems and Agricultural Engineering, University of Kentucky	2002-2007
Professor, Biosystems and Agricultural Engineering, University of Kentucky	1996-2008
Associate Professor, Biosystems and Agricultural Engineering, University of Kentucky	1990-1996
Assistant Professor, Biosystems and Agricultural Engineering, University of Kentucky	1985-1990
Senior Research Support Specialist, Cornell University	1984-1985
Senior Systems Analyst, Cornell University	1983-1984

## Research Interests

Research interests include controlled environment systems research, with emphasis on biological and physiological responses and interactions between occupants and environment; controlled environment systems analysis, control and simulation; control systems development for controlled environment agriculture; post-harvest loss measurements; animal welfare in modern livestock farming; precision livestock farming.

## Teaching

Teaching undergraduate and graduate courses in probability and statistics, thermal environmental engineering, controlled environment systems, residential housing design, computer-aided design, structures and environment, psychometrics, instrumentation, data acquisition and control, instrumentation, linear and nonlinear systems optimization.

## Courses:

ABE 100 – Introduction to Agricultural & Biological Engineering (2009-2013)

TSM 311 – Humanity in the Food Web (2009-2012)

TSM 371 – Residential Housing Design (2009 – 2019)

TSM 130 – Introduction to CAD (2011 – 2019)

ANSCI 205 and 403 – Guest lectures (4) each spring semester (2014-2019)

Advisor – for 1/3 of Illinois TSM students (2-16-2019) and 50% of entering freshman and sophomores in ABE (2012-2016)

## Extension and Consulting

Extension and consulting related to applications of research, including air emissions and mitigation, odor and siting issues, greenhouse and livestock environment control systems and livestock heat stress reduction.

## Awards

Advising award, College of Engineering, University of Illinois	2014, 2015
Fellow, American Society of Agricultural and Biological Engineering (ASABE)	2010
Presidential Citation for “ <i>Dedicating an Extraordinary Amount of Time and Effort to Ensure a Successful and Effective International Livestock Environment Symposium</i> ”, American Society of Agricultural and Biological Engineers	2009
ASABE Honorable Mention Paper Award for Ammonia Emissions from Two Empty Broiler Houses with Built-up Litter	2009
Presidential Citation for Leadership in Chairing the International Livestock Environment Symposium VIII, American Society of Agricultural and Biological Engineers (ASABE)	2008
Henry Giese Structures and Environment Award, American Society of Agricultural and Biological Engineers (ASABE)	2006
ASABE (ASAE) Superior Paper Awards	2014, 2013, 2005, 2004, 1996, 1995, 1989, 1987
ASHRAE Best Poster Award	1995
Outstanding Teacher Award, College of Engineering, Tau Beta Pi, and Department of Agricultural Engineering, University of Kentucky	1995

## Professional Organization Membership

Registered Professional Engineer: KY PE-14892	1987-present
National Society of Professional Engineering	2017-present
American Society of Agricultural and Biological Engineers (ASABE)	1986-present
American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)	1995-present
International Federation of Automatic Control (IFAC)	1995-present
International Commission of Agricultural Engineering (CIGR)	1986-present
Poultry Science Association (PSA)	1988- present
World Poultry Association (WPA)	2001-present
Council for Agricultural Science and Technology (CAST)	1997-2002

## Professional Society Activity

ASABE Board of Directors	2008-2010
CIGR Section 2, Farm Buildings, Systems, Structures and Environment, Board Member – 1 of 2 American representatives	2002-present
ASAE Associate Editor, Structures and Environment Division	2000-2002 and 1990-1995
ASAE Nominating Committee	1999-2001
ASAE Technical Committee SE-301 Environmental Physiology	1987-present
ASAE Technical Committee SE-302 Greenhouse Environment Chairman, Vice Chair, Secretary	1997-1999
ASAE SE-405 Poultry Housing Systems (twice through officer rotation)	1987-present
ASHRAE Technical Committee 2.1 Plant and Animal Environments (Chair, Project Monitoring Subcommittee on \$125,000 grant to obtain Modern Poultry Heat and Moisture Production relations)	1995-present 1999-2003
Bluegrass Chapter of ASHRAE: past officer, Board of Governors	1998-2000
Central Illinois Chapter of ASHRAE	2020

## Honor Society Membership

Gamma Sigma Delta (Agriculture)	1990-present
Sigma Xi (Research)	1982-present
Alpha Epsilon (Agricultural Engineering)	1977-present

## Patent

Timmons, M.B. and R.S. Gates. Method for controlling environment conditions of living organisms based upon time integrated variables. U.S. Patent Office Patent Number 5,573,199.	1995
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## Consulting

4/9 Livestock LLC	Danville, IN	2016-present
US Grains Council	Beijing, China	2014-present
Asian Agribusiness Consulting	Beijing, China	2015
Maxwell Farms	Winchester, IN	2014-2015
National Pork Producers Council	Des Moines, IA	2011-12
American Egg Board, National Pork Producers Council Independent Reviewer for National Air Emissions Monitoring project (US EPA Air Consent Agreement)		2009
Iowa State University	Ames, IA	1999, 2001
Heartland Pork Enterprises	Iowa Falls, IA	2000-2002
Cargill's Shady Brook Farms	Dayton, VA	2003
The Hanor Company	White Hall, IL	1999
AMBIAGRO – Núcleo de Pesquisa em Ambiência e Arquitetura de Sistemas Agro-Industriais, Federal University of Viçosa (UFV), Departamento de Engenharia Agrícola UFV	Viçosa, Brazil	2002-2008
Research Concepts, Inc.	Lenexa, KS	1992-1999
Ajinomoto-Heartland, Inc.	Chicago, IL	1998-2004
North Carolina State University	Raleigh, NC	1995

## Sabbatical Leaves

Federal University of Viçosa, Dept of Agricultural Engineering, Brazil	Aug 2015 – 2016
Iowa State University, Department of Agricultural and Biosystems, Ames IA	Aug 2000- July 2001
University of Natal, Pietermaritzburg, South Africa	Jan-Aug 1993
Agricultural University of Athens, Greece	Jun-Jul 1993
Kitasato University, Towada-Shi, Aomori Japan	Jul-Aug 1993

## Public Service Activities

Prof. Gates was the U.S. member of:

1. 3-person review team for the Biosystems Engineering program at the University of Sao Paulo – Pirassununga. This is the first review of the first such program in South America. 19-21 August 2015.
2. 6-person review team for the Catholic University of Belgium, the first such review that this University had ever commissioned. 2012.

Leader on undergraduate exchange programs between two Brazil Universities and the University of Illinois, and previously lead with Purdue on a funded Department of Education grant to establish the network.

Liaison for cooperative agreement between University of Kentucky and the Federal University of Viçosa, Brazil. This agreement provided a framework for exchange of students and faculty. The agreement was signed in September 2001 in Viçosa, with subsequent faculty and staff visits in 2002-2008.

*Review manuscripts for:*

Transactions of the ASABE/ASAE	annually
Biosystems Engineering	
Journal of Applied Engineering in Agriculture	annually
Journal of Applied Poultry Research	annually
Poultry Science	annually
Animals	annually
Scientia Agrícola (Brazil)	annually
IEEE CSM	2002
Computers & Electronics in Agriculture	periodically
Acta Horticultura	periodically

*Review research proposals for:*

USDA Agricultural Research Service	2010
USDA Small Business Innovative Research (SBIR)	1997-2008
USDA National Research Initiative (NRI) Competitive Grants Program. Served as Panel Manager several times in 1990s and 2000s.	Annually
U.S.-Israel Bi-National Agricultural Research Development (BARD)	1999, 2002, 2008, 2009
Ohio Agricultural Research and Development Center	1998, 2005
Belgium Research in Controlled Environment Agriculture	1994, 1999, 2001, 2003, 2008, 2010
U.S. EPA SBIR Panelist	2006, 2007
U.S. Department of Energy	2008
	2005, 2007
USDA NRI Agricultural Air Quality Panelist	
USDA SBIR Plant Production and Protection (Engineering): Topic Manager	2000
Panelist	1999
USDA NRI Agricultural Systems: Panel Manager and Panelist	1996, 1997, 1998
Review personnel dossiers for promotion and tenure, typically 3-6/yr	2000-present
Review USDA/ARS manuscripts for Beltsville, MD; Clay Center, NE; and Starkville, MS staff scientists (2-4 annually)	2000-present

**Other Professional Service**

Kentucky Rural Energy Consortium Co-founder, Research Programs Coordinator	2001-2008
United Egg Producers Environmental Scientific Panel, Research Subcommittee Chair	2003-2012
American Egg Board Project on "Social Sustainability of US Egg Production," Environment white paper task force.	2008-2014
External Examiner:	2008, 2005,
University of Natal, South Africa	2002, 1999,
1999 Craig Leat M.Sc.	1996
1996 Tony Amankrah M.Sc.	
Federal University of Viçosa, Brazil	
2008 Marcelo Brauer D.S.	
2002 Tadayuki Yanagi, Jr. D.S.	
Catholic University of Leuven, Belgium	
2010 Sezin Eren Öscan Ph.D.	
2005 Cindy Boonen Ph.D.	
University College Dublin, Ireland	
2010 Conor Dowling Ph.D.	

Instructor: Statistics and Modeling Concepts for EMMS Data. Professional Development Workshop, sponsored by ASAE Technical Committee SE-301 Environmental Physiology. Presented at the Annual International Meeting of the ASAE, July 2000. Milwaukee, WI	2000, July
Proctor of Fundamentals of Engineering Exam, Lexington, KY	1999

**University Service – University of Illinois at Urbana-Champaign**

<b>Campus</b>	2017- present
Faculty Senate	2015-2018
Senate Campus Operations Committee	2017-present
Lemman Center for Brazilian Studies – Advisory Committee Member, Affiliate Director for two undergraduate semester study abroad programs:	2018 - present
Affiliate, Center for Latin American and Caribbean Studies	
Bioenergy and Biological Systems Engineering: An Educational Consortium for a Sustainable Agriculture ( <i>US-Brazil Partnership, with Purdue University, Universidade de São Paulo and Universidade Federal de Viçosa</i> )	2008-2014
Transatlantic Biosystems Engineering Curriculum and Mobility (TABE.NET). (US-Europe Partnership, with Virginia Tech, University College Dublin, Madrid Polytechnic University, Agriculture University of Athens, and University of Bari, Italy	

**Department of Agricultural and Biological Engineering:**

Chair, Promotion and Tenure Committee	2018-present
Faculty Advisory Committee	2009-2011, 2015-2018
Course and Curriculum Committee	2008-present
Graduate Committee	2009-present
Search Committees: Department Head, Ag Safety & Health (chair)	2018-present

**College of Agricultural, Consumer and Environmental Sciences**

Dean’s Executive Committee	2017-present
Search Committees: Metropolitan Food Systems, Precision Animal Management, Associate Director of Intl. Programs	2018-2019
Office of Research Review Committee	2015-2016
Dixon Springs Ag Center (DSAC) Faculty Advisory Council	2008-2010
Paul A. Funk Recognition Award Committee	2008-2010, 2018-2019
College Promotion and Tenure Committee	2008-2010
Research Academy Advisory Council	2009-2012
Spitze Land-Grant Professional Career Excellence Award Committee	2008-2010

**College of Engineering**

Dean’s Executive Committee (Alternate)	2009-2015
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## University Service – University of Kentucky

Search Committee, Office of International Affairs, Asst Director of Study Abroad	Fall 2005
Promotion and Tenure Area Committee, Science and Engineering	2001-2003
Director of Graduate Studies, Department of Biosystems and Agricultural Engineering	2001-2003
Dean's Faculty Advisory Council, College of Engineering	1998-2000
Research Committee, Chair, Department of Biosystems and Agricultural Engineering	2001-2002
Computer Committee, Department of Biosystems and Agricultural Engineering	1988-1995, 2000-2002
Graduate Committee, Department of Biosystems and Agricultural Engineering	1995-2001

## INVENTIONS

Features included on some of the inventions listed below illustrate the relevance and impact of research work on industry. Many features and innovations contained within these products have been widely adopted by the U.S. and European agricultural equipment industry. For example, technical features contained in the OpTimer (late 1980's design) have been widely copied and are now standard features on commercially available controllers used for livestock, poultry and greenhouse environment control systems.

- Time Integrated Variable Controller (TIV), an environmental control unit that manipulates livestock environment based on a running average temperature. Patented (with M. B. Timmons, Cornell University). Marketed by Thevco, Montreal, Quebec. 2002-2008.
- Dual Zone (DZ) Greenhouse Stage Controller, heating and ventilation stage controller, with day/night setpoint automation, power relays and capability for independent control of two zones or houses. 1999-2004.
- Oxygen Monitor and Control for Contained Aquaculture. A microprocessor-based device (AquaStager) to actuate supplemental oxygenation equipment. Marketed by Aquatic Eco-Systems, Inc. 1994-1999.
- Shinwa Environmental Controller (SEC), a microprocessor-based environmental control unit for staged ventilation of broiler and swine buildings. Utilizes a programmable staging feature to facilitate installation in different structures. Transition between interval timed-based minimum ventilation to stage 1 of temperature-control ventilation is performed proportional control of the on-time. This feature has become standard for most new control systems. Marketed by Aerotech, Inc. as the AeroStager 1989-1997.
- Profit Producer, a microprocessor-based environmental control system that implements economic optimization strategies in broiler housing. 1986-1989.
- OpTimer, a ten minute cycle timer driven by a commercially available environmental controller, translates an analog signal to a timer function for minimum ventilation in livestock housing. This control logic, similar to that used in the SEC, has been widely adopted by industry. 1989.
- VariTimer, an independent ten minute cycle timer with temperature sensing. Consultant to Optim Ag Ltd. and Research Concepts Inc. for prototype development. 1989.
- Side Kick, a device that translates a pulse width modulated signal into ten discrete fan stages, for U.S.A. livestock environmental control systems. This concept was immediately picked up and promoted by Opticon and Fancom in the Netherlands, and can now be found on all domestic-manufactured systems as well, including those from Chore-Time, Acme Engineering, Thevco, etc. 1989.

## RESEARCH ACTIVITIES – Current Hatch and USDA Regional Projects

NCDC 235: Precision Animal Management, Project establishment team  
NE-1035/1335/1835: Commercial Greenhouse Production. 2008-present.  
NCCC-09: MWPS: Research and Extension Education Materials. 2017-present  
NE-1442/1942: Poultry Production Systems and Well-being: Sustainability for Tomorrow. 2017 - present  
NCERA-219 Swine Production Management to Enhance Animal Welfare. 2011-present  
NCERA-101: Controlled Environment Technology and Use. 2011-present.

Previously PI for S1025, S1032, W173, W1173, W2173, NE-1022, NE-1035, NCERA-29  
Chair, S1025 2011-2012

## Extramural Funding

### *Pending*

1. Biosecure animal mortality and manure management during a possible African swine fever outbreak in the Midwestern U.S. Akdeniz, N., R.S. Gates, Y. Johnson-Walker, Y. Koziel, B. Ramirez. USDA AFRI 2020-2023. \$1M.
2. Engineering an integrated hydrothermal liquefaction-composting process to advance management of poultry mortalities. Akdeniz, Y., Y. Zhang, R.S. Gates. USDA AFRI. 2020-2023. \$500,000.

### *Current and Recent*

1. Certified Livestock Manager Training Program. Illinois Department of Agriculture. R.S. Gates, N. Akdeniz, Y. Xiong and S. Solomon. 2019-2020. \$77,500
2. Development of bioinstrumentation for measuring animal welfare/post-harvest loss assessment/agricultural air quality baseline measurement. R.S. Gates, A. Zanella, C. Gonçalves, H. Savastano Jr., J. Fiorelli, K.O.S. Miranda, L.S. Martello and R.V. Sousa. Program de Professor Visitante no Exterior – PVE. PRINT University of São Paulo/CAPEs. Approx \$4,100.
3. Dry matter loss rates and safe storage time of soybeans using a Dynamic Grain Respiration Measurement System. R.S. Gates. ACES OIP International Seed Grant. \$4,000 student support. 2019.
4. Institutional Project of Internationalization. L.A. Peternelli, A.F. de Carvalho, S.E.F. Guimaraes, A.P. Filho, F.M. Zerbini Junior, C.E.G.R. Schaefer, R.S. Gates. CAPES Brazilian Ministry of Education (PRINT program). R\$24M (approximately 6.3M USD). 2019-2023.
5. Manure Management Technology Assessment and Recommendations to North Carolina Pork Producers Association. R.S. Gates, N. Akdeniz, J.A. Ogejo, J. Harmon. \$60,000. 11/2018 – 9/2019.
6. Developing Faculty and Student Collaboration in Design and Control of Ventilation in Swine Facilities. R.S. Gates and D.J. Moura. Illinois/FAPESP program. \$20,000 from the University of Illinois Lemann Center for Brazilian Studies; R\$78,085 from Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) 2018-2020.
7. Biosecure Animal Mortality Composting for Reducing Release Risk of Pathogens and ARGs. N. Akdeniz, Y. Zhang, R.S. Gates. USDA AFRI. \$299,877. 2/2018 – 1/2020
8. Certified Livestock Manager Training Program. Illinois Department of Agriculture. R.S. Gates. 2018-2019, 2017-2018, 2016-2017. \$75,000/year

### *Recent Submissions*

1. AI-Powered Smart Food Animal Production Systems. Li-Wang et al. NSF/USDA NIFA. \$20M (subcontractor)
2. Cyberinformatic Tools for Enhancing the Well-Being of Neonatal Piglets. Shi, Y., T. Brown-Brandl, I. Condotta, G. Rohrer and R.S. Gates USDA AFRI. 2020-2023. \$500,000
3. Fact Extraction and Verification for Explanation and Recognition (FEVER) for Sustainable Swine Production. 2019. A. Brake (M.S. Student), R.S. Gates, N. Akdeniz. USPCE Pork Information Gateway. Not funded.
4. Online Dynamic Phenotyping to Enhance the Welfare of Neonatal Piglets. 2019. R.S. Gates, G.V. Chowdhary, M. Ellis, T. Brown-Brandl, and I.C.F.S. Condotta. Seed Grant Initiative, University of Illinois Center for Digital Agriculture. \$50,000. Not funded.
5. Livestock 4.0: Smart Tools to Assess Animal Health and Productivity. De Sousa, Rafael Viera, Luciane Martello, Rubens Andre Tabile, Kesia O.S. Miranda, Tami Brown-Brandl, Richard S. Gates, Rodrigo Y. Tsukahara, Juscelino .I. Oliveira Jr. University of São Paulo, Office of the Dean, Program on Intelligent Digital Systems. \$R76,617 (approx. \$20,000). 2019.
6. Value-added Poultry Carcass Processing with Hydrothermal Liquefaction. N. Akdeniz, R.S. Gates, Y. Zhang. USDA AFRI. \$500,000 5/2019-4/2022. Not funded.
7. Valorization of eggshell waste towards production of bioactive peptides. M. Danao, K. Majumder, R.S. Gates, K. Koelkebeck. USDA AFRI. \$500,000. 7/2019 – 6/2021 (\$72,116 subaward). Not funded.
8. Cyberinformatic Tools for Enhancing the Well-Being of Neonatal Piglets. R.S. Gates, G. Chowdhary, T. Brown-Brandl, G. Rohrer. USDA AFRI. \$500,000 2/1/2019-1/31/2021. Not funded.
9. Application of phosphate-enriched biochar to reduce gas and odor emissions from deep-pit manure storages. National Pork Board. N. Akdeniz, W. Zheng, R.S. Gates. 2019-2020. \$64,929. Not funded.
10. Improving Sustainability Practices in Protected Culture Horticulture Production Systems. ACES Extension ICE Program. B. Aly, R.S. Gates, L. Christianson, B. Branham, N. Johanning, J. Zakes. 2019-2021. \$60,000. Not funded.
11. 2<sup>nd</sup> Workshop on Post-Harvest Loss/2<sup>o</sup> Workshop de Perdas Pós-Colheita. ADM-CARES program and ACES Office of International Programs. R.S. Gates, M-G. Danao, R. Zandonadi. October 2018. \$36,000. Not funded.
12. Value-added Eggshell, Eggshell Membrane, and Egg White Residue. M-G. Danao, R.S. Gates. USDA AFRI \$300,000 (\$85,333 subcontract). 1/2018 – 12/2021. Not funded.
13. Review of Eggshell Waste Handling, Treatment Practices, and Valorization Opportunities in the U.S. Egg Industry. \$79,422. US Egg Industry Center. 2018-2019. Not funded.
14. Broiler Facility Energy Use using Hybrid Ventilation Controls and Effects of Air Velocity and Temperature on Meat-Type Quail in Brazil. ACES International Joint Research Program. \$20,000. 2018-2019. Not funded.
15. Developing Faculty/Student Exchanges for Livestock Facilities and Manure Management. \$4,000. ACES Office of Intl Programs: Seed Grant. 2018. Not funded.



16. Seasonal reproductive failure and poor litter performance in parity 1 sows due to environmental variation and physiological responses in gestation and farrowing. National Pork Board. R. Knox, R.S. Gates, L. Ochoa, J. Connor and K. Bhalerao. \$99,937. 2017-2019. Not funded.
17. Enhanced Under-Represented Undergraduate Training in Global Food Security. USDA NIFA AFRI Research and Experiential Experiences for Undergraduates. R.S. Gates, C. Gundersen, B. Fiese, M. Blumthal, J. Thompson. \$300,000. 2017-2020. Not funded.
18. Enhanced Undergraduate Training in Global Food Security. Partners of the Americas (US Dept of State). \$50,000. 2016-2017. Not funded.
19. Chile-USA Study Abroad Program with Service-Learning: Lean Manufacturing. Partners of the Americas Foundation, DOS and NAFSA. \$70,000. R.S. Gates, T. Finis, M. Blumthal and B. Litchfield. Not funded.
20. Development of a novel two-step, automated euthanasia systems for humane euthanasia of piglets using nitrous oxide. USDA NIFA AFRI. D.C. Lay Jr., R.S. Gates, J.-L. Rault, C. Johnson. \$499,216. Not funded.
21. Environmental Probiotics: Manipulating Microbial Ecology of Poultry Housing to Reduce Egg-borne Pathogens. A. Kent, A.R. Green and R.S. Gates. National Science Foundation, Ecology of Infectious Diseases Program. \$1,891,081. 2013 – 2017. Not funded.
22. Modernizing Agricultural Education and Training Systems Program. US Agency for International Development. R.S. Gates and J.E. Pettigrew. 2012-2017. \$6,250,004. Not funded.
23. Integrated Approaches to Climate Change and Variability for the Midwest Pork Industry. USDA AFRI Global Climate Change. D. Meisenger, et al. 5 years. 2012 – 2017. \$10,000,000. Not funded.
24. A USA-China-Brazil Consortium for Environment-Enhancing Energy Research and Education. NSF PIRE Program. Y. Zhang et al. 3 years 2012-2015. \$5,000,000. Not funded.
25. Microbial Community Analysis to Identify Risk Factors in Manure Foaming. National Pork Board. R.S. Gates, A. Kent, T. Funk and L. Pepple. 2012-2013. \$30,000. Not funded.
26. Vertical Vegetable Farming R&D for Total Resilience in Leafy Vegetable Supply for Singapore. Collaborator. Proposal for NRF-funding for Meeting Future Food Demands for Singapore, submitted by AFV of Singapore, Singapore University of Technology and Design, Advanced Digital Sciences Center, University of Illinois and SkyGreens PL. Approximately \$10,000,000. Not funded.
27. Improving Safety of Deep-Pitted Swine Barns. NIOSH Ag Center, University of Nebraska – Lincoln (subcontract to University of Minnesota). R.S. Gates, M.Robert, A.Kent, R. Aherin, T.Funk. 2011-2016. \$219,164. Not funded.
28. Specialty Crops Enterprises for Enhanced Local Self-Reliance and Resilience. X. Wang and R.S. Gates. USDA SCRI. Subcontract to Ohio State. 2011-2016. \$1,000,933. Not funded.
29. Environmental Probiotics: Manipulating Microbial Ecology of Poultry Housing to Reduce Egg-borne Pathogens. A. Kent, A.R. Green and R.S. Gates. National Science Foundation, Ecology of Infectious Diseases Program. \$1,891,081. 2011 – 2014. Not funded.
30. USPCE Integrated, Sustainable Approaches to Climate Change for the Midwestern Pork Industry. USDA AFRI Global Climate Change Program. \$20,000,000. D. Meisenger, R.S. Gates, L.D. Jacobson, E. Cortus and J. Koziel. (University of Illinois subcontract, \$4.6M) 2011-2015. Not funded.

31. Environmental Management Risk Factors for E. coli Peritonitis in Layer Hens: A Basis for Prevention and Control. USDA AFRI, Foundational Programs, Animal Health. A.R. Green, A. Kent, Kohrt, Gates. \$499,925. 2011-2016. Not funded.
32. Developing Scholars in Agricultural Systems Engineering for a Bio-Based Economy. USDA National Needs Program. 2011-2015. Co-PI with M.G. Danao, S.R. Eckhoff, R.S. Gates and Y. Zhang. \$236,000. Not funded
33. Decision Support for Environmental Management of Cage and Cage-Alternative Layer Housing Systems for Thermal Comfort and Air Quality. USDA AFRI Animal Welfare Program. A.R. Green, R.S. Gates and Y. Johnson. \$699,899. Not funded
34. Establishing vibrant specialty crops enterprises for building self-reliant and resilient cities. R.S. Gates, X. Wang, T. Funk and D. Warnock. USDA Specialty Crops Research Initiative. Subcontract to Ohio State University. \$1,499,967. Not funded.
35. Developing Scholars in Agricultural Systems Engineering for a Bio-Based Economy. USDA National Needs Program. 2010-2014. Co-PI with M.G. Danao, S.R. Eckhoff, R.S. Gates and Y. Zhang. \$236,000. Not funded
36. Sustainable and Competitive Controlled Environment Plant Production Systems (CEPPS). USDA Specialty Crops Research Initiative Planning Grant. Co-PI with D. Warnock (NRES), B. Branham (NRES) and K.C. Ting (ABE). 2009-2010. \$50,000. Not funded
37. Quantifying and Reducing Uncertainty in Ventilation Rate Measurements to Improve Emission Estimation from AFOS. USDA Agriculture and Food Research Initiative. Co-PI with K.D. Casey (Texas A&M) and Y. Liang (University of Arkansas). 2009-2012. \$600,000 (\$222,992 subcontract to UIUC). Not funded
38. Dairy Producer Management Strategies for Composted Bedded Pack in Loose Housing that Minimize GHG Emissions and Maintain Herd Productivity. USDA Agriculture and Food Research Initiative. Co-PI with J.L. Taraba, G.B. Day, V., M. Coyne, J.M. Bewley, and D.G. Overhults (University of Kentucky). \$599,985. (\$102,520 subcontract to UIUC.) Not funded

*Recently Completed Funded Research and Extension Activities*

1. Elevated CO<sub>2</sub> Effects on Turkey Poults aged 0-3 Weeks. Industrial Collaborative Research, Hendrix Genetics. \$30,000. 2017.
2. Development of a novel two-step, automated euthanasia system for humane euthanasia of piglets using nitrous oxide. USDA NIFA AFRI. D.C. Lay Jr., R.S. Gates, J.-L. Rault. \$499,216. 2015-2017.
3. Decision Support for Environmental Management of Cage and Cage-Alternative Layer Housing Systems for Thermal Comfort and Air Quality. USDA AFRI. A.R. Green, R.S. Gates, Y. J. Johnson-Walker, H. Cheng. 2012-2017. \$699,896.
4. Thermal Perches as Cooling Devices for Reducing Heat Stress in Caged Laying Hens. USDA NIFA AFRI. H.W. Cheng, P.Y. Hester, R.S. Gates, M.M. Makagon, W. Wigle, N.J. Olynk Widmar. 2013-2017. \$499,814.
5. Measurement and documentation of Brazilian postharvest loss. ADM Institute for Postharvest Loss, University of Illinois. M. Arends-Kuenning, R.S. Gates, M.-G. C. Danao (UIUC); M. Garcias, A.L. Kassouf (ESALQ); R. Zandonadi, R. Nogueira, S. Ruffato (UFMT). \$300,000. 2015-2017.
6. *Ambiência Animal em Condições de Climas Quentes – Ferramentas e Sistemas Inteligentes de Avaliação do Cenário Térmico, Aéreo e Comportamental e Suas Relações no Espaço e no Tempo Para a Avicultura de Postura.* (Animal Environments in Hot Climates: Tools and Intelligent Systems for Evaluating the Thermal Environment and its Relation to Space and Time in Laying Hen Facilities.) *Ciências Sem Fronteiras* (Science Without Borders). *Programa de Pesquisador Visitante Especial.* (Special Visiting Researcher program). *Conselho Nacional de Desenvolvimento Científico e Tecnológico* (CNPq). 2013-2016. R\$92,000. Supports monthly stipend, travel, Brazilian graduate students and up to three months per year in Brazil for three years.
7. Microbial Ecology Evaluation of Foam Production in Swine Deep-Pit Manure Storages. Iowa Pork Producers, subcontract with Iowa State University. R.S. Gates, L. Pepple, A. Kent. 2012 – 2013: \$156,713. 2013-2014: \$114,762, 2015-2016: \$77,933.
8. Measurement, Documentation and Postharvest Processing for the Prevention of Postharvest Losses of Soybeans and Corn in Brazil. ADM Institute for Post-Harvest Loss. M.G. Danao, R.S. Gates, M.R. Paulsen, K.D. Rausch. 2012-2015. \$585,000.
9. Certified Livestock Manager Training Program. Illinois Department of Agriculture. R.S. Gates and L. Pepple. 2013-14, 2014-15, 2015-2016. \$75,000/year.
10. *Modificações ambientais em aviários de postura em alta densidade de alojamento e seus efeitos sobre o desempenho produtivo das aves e a qualidade dos ovos.* (Modified Environment in High Density Laying Hen Facilities and its Effect on Productive Improvement and Egg Quality.) *FAPEMIG- Fundação de Amparo à Pesquisa do Estado de Minas Gerais.* (Research Agency of the state of Minas Gerais, Brazil).
11. *Programa Bolsa Pesquisador Visitante Especial* (Special Visiting Researcher Program, State of Minas Gerais, Brazil). R\$17,500. 2013
12. Microbial Community Analysis to Identify Risk Factors in Manure Foaming. National Pork Board. R.S. Gates, T. Funk, A. Kent and L. Pepple 2011-2012. \$29,983.
13. Mitigation Monitoring and Microbial Assessment of Gas-Phase Biofilters and Extension Outreach. U.S. Department of Agriculture, Air Quality Program. K.A. Janni, J. Schilling, L.D. Jacobson, J. Harmon, S. Hoff, R. Nicolai, and R.S. Gates. February 1, 2010 Project Duration: 3 years. 2010-2013. \$597,806. (\$6,812 subcontract.)

14. Bioenergy and Biological Systems Engineering: An Educational Consortium for a Sustainable Agriculture. R.S. Gates, A.R. Green, L.R. Rodriguez, K.C. Ting, Y. Zhang (UIUC), and B. Engel, R. Mohtar and O. Campanella (Purdue University), U.S. Department of Education Fund for the Improvement of Post-Secondary Education U.S.-Brazil Program. PI. University of Illinois at Urbana-Champaign, Purdue University, University of São Paulo-Pirassununga, and Federal University of Viçosa. \$250,000.
15. Transatlantic Biosystems Engineering Curriculum and Mobility (TABE.NET). U.S. Department of Education Fund for the Improvement of Post-Secondary Education Atlantis Program. M.L. Wolfe and S. Mostaghani (Virginia Polytechnic Institution) and R.S. Gates (UIUC). September 1, 2009. Project duration: 4 years. 2009-2013. \$192,000.
16. Integrating education and development of a biodegradable litter amendment to mitigate ammonia emissions from poultry houses. USDA NRI Air Quality program. Co-PI with J. Arogo, Virginia Polytechnic Institution. 2009-2013. \$77,128 subcontract to UIUC.
17. Mitigation Monitoring and Microbial Assessment of Gas-Phase Biofilters and Extension Outreach. USDA NRI Air Quality program. K.A. Janni, J. Schilling, L.D. Jacobson, J. Harmon, S. Hoff, R. Nicolai, R.S. Gates. 2010-2013. \$597,806.
18. Characterization of PM<sub>2.5</sub> and PM<sub>10</sub> particulate emissions and the relationship to activity in typical poultry houses. \$532,346, 2008-2010, W.F. Ritter, E.R. Benson, M.V. Johnston, G.L. VanWicklen, and R.S. Gates).
19. Feeding DDGS and Other Altered Diets to Egg Laying Hens to Demonstrate Economically Viable Reductions in Ammonia Emissions – a United Egg Producers Endeavor with University Collaborators. United Egg Producers, Inc. (\$1,847,248 request; \$25,908 subcontract to UI). 2008-2010. USDA NRCS Conservation Innovation Grants program.
20. Feeding DDGS and Other Altered Diets to Egg Laying Hens to Demonstrate Economically Viable Reductions in Ammonia Emissions – a United Egg Producers Endeavor with University Collaborators. United Egg Producers, Inc. (\$1,847,248; \$24,972 subcontract to UK). 2007-2008. USDA NRCS Conservation Innovation Grants program.
21. Gaseous production from impermeable swine waste storage tanks and its abatement using biofilters. USDA National Research Initiative Air Quality Program. 2008-2010. \$41,572 subcontract to UIUC.
22. Poultry House Evaluation Service. Kentucky Poultry Federation (\$825,716 request to Kentucky Agricultural Development Board, \$395,566 subcontract to UK). 2007-2010. D.G. Overhults, R.S. Gates and A.J. Pescatore.
23. Development of Line-Scan Image Algorithms for Inspection of Poultry Carcasses. USDA ARS Specific Cooperative Agreement. \$10,000. 2007-2008.
24. Fan Assessment Numeration Systems (FANS) for Agricultural Building Ventilation Measurement in Emissions Testing. Contract with Purdue University. 2007. R.S. Gates, P.I. \$60,000
25. Gaseous production from impermeable swine waste storage tanks and its abatement using biofilters. USDA National Research Initiative Air Quality Program. R.S. Gates, A. Singh, S.F. Higgins and E.G. Wilkerson. \$487,087, 2007-2009.
26. Biosystems and Agricultural Engineering – Educational Consortium for Sustainable Plant and Animal Production Systems. \$204,000. Project leader. With Iowa State University, and four Brazilian Universities (Viçosa, Lavras, Campina Grande, Piracicaba). U.S. Department of Education’s Fund for the Improvement of Postsecondary Education (FIPSE), 2003-2008.

27. Energy Seed Grant Technical Merit Review. Governor's Office of Energy Policy, Division of Renewable Energy and Energy Efficiency. R.S. Gates. \$27,963, 2006-2008.
28. Ammonia Gas Sensors for Agricultural Applications. Synkera Technologies Inc. R.S. Gates. \$15,535. 2006-2007.
29. Field Verification of Ammonia Emission Mitigation Strategies for Layer Houses. H. Xin, R. Burns, R.S. Gates, P. Patterson and E.F. Wheeler. US Poultry & Egg. \$75,285 to Iowa State University.
30. Kentucky Rural Energy Supply Program, C. Metcalf (University of Louisville, \$1,984,000 U.S. Department of Energy). R.S. Gates, S.E. Nokes, D.G. Colliver and M.D. Montross \$268,600 (subcontract awarded by University of Louisville for competitive grants administration). 2005-2007.
31. Total Suspended Particulate, PM10, PM2.5, Hydrogen Sulfide and Hydrocarbon National Consent Agreement Emissions Determination from Broiler Production Systems. R.T. Burns, H. Xin, R. Gates and S. Hoff. \$648,231 awarded by Tyson Foods. 2005 -2007. (UK subcontract \$60,000).
32. Ammonia Emissions Determination from Broiler Production Systems. R.T. Burns, H. Xin and R.S. Gates. \$399,525 awarded by Tyson Foods. 2005-2007. (UK subcontract \$92,121).
33. Effect of enzyme inhibitors on ammonia emission from broiler houses. \$18,000. R.S. Gates, A. Singh, K. Casey and A. Pescatore. North Carolina Animal and Poultry Waste Management Center. 2004-2006
34. Energy-Star Energy Efficient State Fair Exhibit. \$22,700. R.E. Fehr, G. Hash and R.S. Gates. KY Natural Resources and Environmental Protection Cabinet, Division of Energy. 2004-2005.
35. A Cooperative Extension Program for Kentucky's Building Systems Energy Needs. \$63,066. R.E. Fehr and R.S. Gates. KY Natural Resources and Environmental Protection Cabinet, Division of Energy. 2004-2005.
36. Reduced Ammonia Emissions from Poultry Houses by Enhanced Manure and Diet Management. \$870,000. USDA IFAFS. 2001-2005. Project leader. Participants include University of Kentucky, Iowa State, Penn State, University of Nebraska, USDA-ARS Southern Poultry Lab, US-EPA, and a private nutritionist.
37. Development of Robust, Automatic Calibration Algorithms for On-line Detection of Diseased and defective Poultry Carcasses. \$358,043. PI. 2002-2007. USDA-ARS, Instrumentation and Sensing Laboratory, Beltsville, MD.
38. Developing a Low-Cost, Portable Vision Device for Inspecting Agricultural Products for Safety. \$356,570. PI. USDA-ARS. 2002-2006. Instrumentation and Sensing Laboratory, Beltsville, MD.
39. Energy-Star Energy Efficient State Fair Exhibit. \$20,000. PI. KY Division of Energy. 2003-2004.
40. A Cooperative Extension Program for Kentucky's Building Systems Energy Needs. \$59,882. PI. KY Division of Energy. 2003-2004.
41. Estudo de um Sistema de Resfriamento Adiabático Evaporativo, com o Emprego de Materiais Alternativos em Instalações Climatizadas para Produção Animal, nas Condições Brasileiras. (Study of alternative evaporative cooling materials for animal production in Brazilian conditions) FAPEMIG – Fundação de Amparo à Pesquisa do Estado de Minas Gerais, Brasil (Research Funding Agency of State of Minas Gerais). Ref. CAG 679/2002. R\$21,000 2002-2004. This funded Ricardo Vigoderis' M.S. project. Co-PI. (PI: Prof Ilda Tinôco).

42. Sistema de Mensuração de Amônia em Ambientes Abertos e Aplicação em Manejos de Criação de Frango de Corte e Suínos, nas Diferentes Estações Climáticas no Sul e Sudeste do Brasil – Avaliação da Qualidade do Ar, Produção de Calor, Conforto Térmico e Desempenho. (Amonia measurement system for open buildings with application to broilers and swine facilities in Southern and Southeastern Brazil – Evaluation of Air Quality, Heat Production and Thermal Comfort). CNPq – National Council of Technological and Scientific Development (Technology and Science Ministry, Brazilian Federal Agency). Support for 6 graduate students, 6 undergraduate students and 1 researcher. 2003-2006. Co-PI. (PI: Prof Ilda Tinôco).
43. Avaliação do Sistema de Cama Sobreposta na Produção de Suínos na Fase de Crescimento e Terminal, em Condição de Inverno no Sul do Brasil. (Evaluation of a deep-bed litter system in swine nursery and finishing facilities during winter in southern Brazil). CAPES – Coordenação de Aperfeiçoamento de Pessoal de Nível Superior and EMBRAPA – Empresa Brasileira de Agropecuária (Brazilian Research on Agro-business, Concordia) with Federal University of Viçosa. R\$30,000 for one M.S. student project. 2001-2003. Co-PI. (PI: Prof Ilda Tinôco).
44. Quantification of Feeding and Drinking Behavior of Poultry for Enhanced Animal Well-Being. \$150,709. USDA NRI. 2000-2001. PI.
45. Amino Acid Nutrition in Broiler Diets. \$15,000 gift. Ajinomoto Heartland Inc. Co-PI with H. Xin, Iowa State University. 2001.
46. Amino Acid Nutrition in Layer Diets. \$10,000 gift. Ajinomoto Heartland Inc. University of Kentucky. 2001. PI.
47. Optimizing Partial Surface Wetting to Cool Caged Layers. U.S. Poultry and Egg Association. \$52,279. Co-PI with H. Xin, Iowa State University and M. Beck, University of Nebraska. 2001-2002.
48. Cooling Cage Laying Hens by Partial Surface Wetting, U.S. Poultry and Egg Association. \$24,000. 2000-01. Co-PI with H. Xin, Iowa State University. 2000-2001.
49. Towards a dynamic system for controlling mist propagation of softwood cuttings. Gloeckner Foundation. \$10,000 (2000-2001), \$9,000 (1999-2000). Co-PI with R. Geneve, Horticulture Department.
50. Evaluating Improved Environmental Systems for Tobacco Greenhouses. \$9,475. With G.A. Duncan. Council for Burley Tobacco. 1998-2000.
51. Equipment grants for automated greenhouse environment control. \$7,529. Co-PI with G.A. Duncan. 1999-2000.
52. Ammonia Emissions from Poultry Litter. Heartland Lysine, Inc. PI. \$28,200 gift. 1999-2000.
53. Development of an instrumentation system to measure individual chicken feeding and drinking behavior as influenced by environment and nutrition interactions. \$54,000. 1998-2000. With Drs. H. Xin and M. Puma, Iowa State University and Heartland Lysine, Inc.

## TEACHING AND STUDENT ACTIVITIES – UNIVERSITY OF ILLINOIS

### Courses Taught

TSM 371	Residential Housing Design	Spring 2009-present
TSM 130	Basics of AutoCAD	Each semester since Fall 2015-Spring 2018, each fall to present
TSM 199	Basics of AutoCAD	Each semester Fall 2011- Spring 2015
ABE 100	Introduction to Agricultural and Biological Engineering	Fall 2009-2013
TSM 311	Humanity and the Food Web	Fall 2009, Spring 2010

## TEACHING AND STUDENT ACTIVITIES – UNIVERSITY OF KENTUCKY

### Courses Taught

AEN 103	Surveying (for Landscape Architects)	Fall 2005
AEN 202	Biosystems Engineering Problems (Biometrics)	Annually, 1990-1999
BAE 202	Statistical Methods for Biosystems Engineering	Spring, 2008
GEN 300	Co-taught. (This course was an introduction to French culture and agriculture and required as part of cooperative two-week visit or six-week internship with the ENESAD program in Dijon, France.)	Spring 1996, 1997
	Traveled with 14 University of Kentucky, 9 University of Nebraska and 1 Clemson student	1996
AEN 302	Analytical and Numerical Methods in Biosystems	Annually, 1988-1997
ASC 340	Poultry Production Systems: guest lecturer on environment control	1994-2000
BAE 450	Fundamentals of Electricity for Agriculture (special problem)	2005
AEN 427G	Structures	1991, 1992
BAE 427	Structures and Environment Design	2002-2008
AEN 599	PC-Based Data Acquisition and Control	1994-1999, co-taught 2001
PLS 605	Graduate Research in Horticulture: guest lecturer on VPD control	1998, 1999
AEN/ME 647	Systems Optimization I	1999, 2002, 2003, 2004
AEN 658	Instrumentation for Research	1992, co-taught 2002
AEN 750	Special Problems, as required for graduate students	approximately each 3 semesters

### Advising at University of Illinois and Kentucky

Faculty Advisor for ASABE Student Branch, 2018-2019

Faculty freshman-sophomore advisor for the Department of Agricultural and Biological Engineering's Technical Systems Management degree program, 2018-present.

Faculty freshman-sophomore advisor for the Department of Agricultural and Biological Engineering's engineering degree program, 2012-2017.

Undergraduate advisor for the Bioenvironmental Engineering Section, Department of Agricultural and Biological Engineering, University of Illinois.

Faculty advisor for the Controlled Environment Systems Engineering Program in the Department of Biosystems and Agricultural Engineering, University of Kentucky. Encouraged student participation in local ASHRAE Chapter. Provided job placement and summer training of students.

## Graduate Students Advised

### University of Illinois at Urbana-Champaign

Name	Degree	Year
Michael Stablein	Ph.D.	In progress, committee member
Abigail Brake	M.S.	In progress, co-Advisor
Mariane Pastorelli Latanze	M.S.	In progress, co-Advisor
Loren Steinman	M.S.	In progress, co-Advisor
Yijie Xiong	Ph.D.	2019, Advisor Title: Engineering Solutions to Address Several Current Livestock and Poultry Housing Challenges
Chris Miller	Ph.D.	2019, UC-Davis, committee member
Michael Stablein	M.S.	2018, committee member. Title: Augmented Growth of <i>Haematococcus Pluvialis</i> using Nitrogen Nutrients from Post Hydrothermal Liquefaction Wastewater (PHWW)
Ana Pereira da Silva	M.S.	2018. Advisor Title: Dry Matter Loss Rates of Soybeans: Effects of Respiration Measurement System, Damage by Splits, and Moisture Content at Elevated Temperatures
Patricia Paulausky	M.S.	2018. Advisor. Title: Application of an Agent-Based Modeling Approach to Study the Postharvest Loss of Food Grains in India
Lucas Trevisan	M.S.	2017. Advisor. Title: Evaluating Dry Matter Loss Rates of 14 to 22% Moisture Content Soybeans at 35°C Using a Dynamic Grain Respiration Measurement System
Shan-Jen Yang	Ph.D.	2017. committee member Title: Development of Dynamic Computational Model for an Integrated Farming System
Yanxi Lu	M.S.	2016, committee member Title: Evaluating New Ventilation Rate and Evaporative Cooling for Modern Swine Production.
Zhonghua Zheng	M.S.	2016, committee member Title: Impedance-based moisture content sensor assessment for gas-phase biofilters
Kaneeka Sood	M.S.	2015. Co-advisor Design and Evaluation of a Grain Respiration Measurement System for Dry Matter Loss of Soybeans
Akaterini Kasimati	M.S.	2015, Advisor Characterizing Water Holding Capacity and Total Solids of Manure-Bedding Mixtures
Boyu Ji	M.S.	2015, Advisor An Innovative Portable Monitoring Unit for Air Quality in Animal Housing
Peng Li	Ph.D.	Withdrew from program
Laura M. Pepple	Ph.D.	Withdrew from program
Brett Ramirez	M.S.	2014, committee member
Wilhelmi, Christopher	M.S.	2014, non-thesis MS, committee member
Jonathon Olsen	Ph.D.	January-December 2013, Advisor
Yijie Xiong	M.S.	2013, co-advisor
Yi Sun	M.S.	2013, co-advisor



Gilber Turner	M.S.	2013, advisor
Ryan Johnson	M.S.	2013, committee member
Liangcheng Yang	Ph.D.	2013, committee member
G. Tatiana Sales	Ph.D.	2012, co-advisor
D. Barker	Ph.D.	2012, committee member
Shi-Fang Chen	Ph.D.	2012, committee member
W. (David) Liu	Ph.D.	Withdrew from school
W. Yan	Ph.D.	2010, committee member
X. Yang	Ph.D.	2010, committee member
J. McClure	Ph.D.	2010, committee member
C. Cirone	M.S.	C2010, committee member

***Federal University of Viçosa, Brazil***

<b>Name</b>	<b>Degree</b>	<b>Year / Title</b>
Almir Antônio Birits	D.S.	In progress, advisor
Fabiane de Fátima Maciel	D.S.	In progress, advisor
Harold Torres	M.S.	In progress, advisor
Germán Sanchez	M.S.	In progress, advisor
Monique O. Vilela	D.S.	2020 (advisor) Title: CFD Modeling to Evaluate the Environment in Tunnel Ventilated Broiler Housing
Tatiany C. dos Santos	D.S.	2020 (advisor) Title: Evaluation of Different Air Temperature and Air Velocity Conditions on Performance and Carcass Characteristics and Meat Quality of European Quail
Carlos G. Teles Junior	D.S.	2019 (advisor) Title: Consumo Energético e Ambiente de Galpões Avícolas Fechados e Potencial de Implementação de Sistema Híbrido de Acondicionamento Térmico
Márcia G. Cândido Lima	D.S.	2019 (advisor) Title: Thermal Tolerance, Performance, and Physiology of Egg-Type Pullets when Subjected to Different Levels of Heat Stress During the Brooding and Growing Phases Sequentially
Willian Rufino Andrade	M.S.	2019 (advisor) Title: Effect of Biochar Addition on Anaerobic Digestion of Laying Hen Manure
Letícia Cibele da Silva Ramos Freitas	D.S.	2018 (co-advisor) Title: Variabilidade Espacial das Condições Térmicas, Intensidade Luminosa e Qualidade de Ovos em Aviários Verticais de Galinhas Poedeiras Ventilados Naturalmente
Luis Gustavo F. Franca	D.S.	2017, (advisor) Title: Excreção de nitrogênio por galinhas poedeiras submetidas a diferentes temperaturas e níveis de energia metabolizável na ração.
Tatiany Carvalho dos Santos	M.S.	2016, (advisor) Title: Associação de diferentes temperaturas e velocidades do ar sobre as respostas comportamentais, temperatura superfície corporal e produção de codornas japonesas ( <i>Coturnix coturnix japonica</i> )

Monique O. Vilela	M.S.	2016 (advisor) Title: Comportamento e desempenho produtivo de codornas japonesas submetidas a diferentes regimes de calor e umidade, combinados com diferentes níveis de velocidade do ar
Carlos G. Teles Junior	M.S.	2016, (advisor) Title: Análise de Imagem na Avaliação do Comportamento Ingestivo e Ganho de Massa Corporal de Frangos de Corte Em Fase Inicial, Submetidos a Diferentes Ambientes Térmico
Múcio Mendes	D.S.	2015 (advisor) Title: Caracterização do Ambiente Térmico De Aviários de Postura, em Sistemas Verticais, Ventilados Naturalmente E por Pressão Negativa Em Modo Túnel
Maria F.V. Araujo	D.S.	2015 (advisor) Title: Efeitos de Duas Condições Climáticas, Duas Linhagens e Dois Sistemas de Ventilação no Desempenho Produtivo de Galinhas Poedeiras Alojadas em Sistemas Verticais de Criação
Maurílio Duarte Batista	M.S.	2014 (advisor) Effective microorganisms (EM) com bioalimentadoras na digestão anaeróbia de resíduos de bovinos
Múcio Mendes	M.S.	2012 (co-advisor) Title: Caracterizarão química e física de excretas de codornas européias submetidas a variações de temperatura em câmaras climáticas como indicativo de níveis de estresse calórico, emissão de amônia e adequação a compostagem
Michelle dos Santos	M.S.	2012 (committee member)
Jairo A. Osorio Saraz	D.S.	2010 (co-advisor)
Olga Marín	M.S.	2010 (co-advisor)
Marcos Oliveira de Paula	D.S.	2009 (committee member)
Mariano Pereira Silva	D.S.	2007 (committee member)
Marcelo Bastos Cordeiro	D.S.	2007 (co-advisor)
Ricardo Brauer Vigoderis	D.S.	2006 (co-advisor)
Claudio Elfar do Silva	M.S.	2002 (co-advisor)
Ricardo Brauer Vigoderis	M.S.	2002 (co-advisor)
Marcelo Bastos Cordeiro	M.S.	2003 (co-advisor)
Robson de Paulo	M.S.	2003 (co-advisor)
Mariano Silva	M.S.	2003 (co-advisor)
Tadayuki Yanagi	D.S.	2002 (at Iowa State University, co-advisor)

### ***University of Kentucky***

<b>Name</b>	<b>Degree</b>	<b>Year</b>
Jamie Marsh	M.S.	2008
G. Tatiana Sales	M.S.	2008
Peng Li	M.S.	2008 (co-advisor)
Maira Freire do Amaral	M.S.	2007
Kenneth Casey	Ph.D.	2005
Joseph Purswell	Ph.D.	2004
G. Avery Watkins	M.S.	2004
Virginia-Bibb Golden	M.S.	2004
Jeremiah Davis	M.S.	2004 (co-advisor)
Angela Green	M.S.	2004

Erin Wilkerson	M.S.	2002
Sérgio Zolnier	Ph.D.	1999
Kevin Chao, Ph.D.	Ph.D.	1996
Christian Mach	M.S.	2000
Nan Tao	M.S.	1999
Hsien-Chung Chi	M.S.	1993
Shu Hui Zhang	M.S.	1992
Jeff Tolzin	M.S.	1988

*Committee member for the following students in various Departments at the University of Kentucky*

<b>Department</b>	<b>Name</b>	<b>Year</b>
Animal Science	Neal Paton	2001
Biosystems and Agricultural Engineering	Flavio Damasceno	2012
	Lucas de Melo	2012
	Gabriella Morello	2011
	Igor Lopez	2011
	Guilherme del Nero Maia	2010
	Morgan Hayes	2008
	Ellie Derbyshire	2007
	J. Swamy	2007
	George B. Day, V	2005
	Carmen Agouridis	2004
	Mari Chinn, Ph.D.	2003
	Sefa Tarhan	2001
	Czarina Crofcheck	2001
	Mari Chinn, M.S.	2000
	Elizabeth Bullock	1999
	Ronnie Paul	1999
	Jane Patterson	1999
	W. Peter Sun, Ph.D.	1998
	Tami Brown-Brandl	1997
	Sefa Tarhan	1996
	Karen Lochte	1995
	Ronald E. Lacey	1992
	Wen Ping Qiu	1992
W. Peter Sun, M.S.	1992	
John P. Chastain, Ph.D.	1991	
Thomas F. Burks	1989	
James Usry	1989	
G. Scott Osborn	1988	
John P. Chastain, M.S.	1987	
Entomology	David Held	1999
Mechanical Engineering	Keng Chuah	2004
Veterinary Sciences	Cédric Holtz	2000

*External Examiner*

<b>Name</b>	<b>Degree</b>	<b>Year</b>	<b>University</b>
Conor Dowling	Ph.D.	2012	University College Dublin, Ireland
Sezin Eren Öscan	Ph.D.	2011	M-3 Bio-Res, Catholic University of Leuven, Belgium
Cindy Boonen	Ph.D.	2005	Agricultural Engineering, Catholic University of Leuven, Belgium

Craig M. Leat	M.Sc.	1999	Agricultural Engineering, University of Natal, South Africa
Tony Amankra	M.Sc.	1996	Agricultural Engineering, University of Natal, South Africa

### Other Student, Post-Doctoral and Advising Activities

#### Host

Name	Dates	University
Juliana Soares Zeymer	2019	Doctoral Student, Federal University of Viçosa, 6-month sandwich program at UIUC
Zhi Zhang	2018-2019	Professor, NW Ag & Forestry University, Shaanxi, China, 1-yr sabbatical
Marcia G.L. Candido	2017-2018	Doctoral Student, Federal University of Viçosa, 1-yr sandwich program at UIUC
Domingos Sarvio Valente	2017-2018	Professor, Federal University of Viçosa, 1-yr sabbatical at UIUC
Tania Baptista dos Santos	2013-2014	Professor, 1-yr sabbatical, State University of Mato Grosso do Sul, Aquadiana, Brazil
Mohammadamin Kashiha	2013	Doctoral Student, Catholic University of Leuven, Belgium
Danilo Pereira	2012-2013	Professor, 1-yr sabbatical, State University of São Paulo at Tupá, Brazil
Ana Paula de Assis Maia	2010-2011	Doctoral Student, 6 month sandwich program, State University of Campinas (UNICAMP), Campinas, São Paulo, Brazil.
Giselle Borges	2010-2011	Doctoral Student, 1-year sandwich program, University of São Paulo – Piracicaba (ESALQ)
Karla Lima	2009-2010	Doctoral Student, 1-year sandwich program, State University of Campinas (UNICAMP), Campinas, São Paulo, Brazil.
Professor Wallace Nascimento	2004-2005	Sabbatical leave from Federal University of Campina Grande
Professor Ilda F.F. Tinôco	2002-2003	Sabbatical leave from Federal University of Vicosa, MG Brazil
Professor Adelson A. Tinôco	2002-2003	Sabbatical leave from Federal University of Vicosa, MG Brazil
Professor N.S. Ferguson	1997-1998	Sabbatical leave from University of Natal, South Africa
P. Huang	1994	Post-doctoral study visit, Hunan Normal University, China

Past Chair, Graduate Committee, Department of Biosystems and Agricultural Engineering, University of Kentucky: Review all applications for admission, graduate student research proposals and progress reports.

*Special Projects:* Support for Horticultural Science undergraduate thesis projects.

*ASAE Student Branch:* Faculty Advisor 1996-1997; Hosted Southeast Student Rally in Lexington, KY 1998.

*Student Recruitment:* Meet with prospective students, attend shows, field days and open houses, and provide tours of campus facilities and departmental laboratories as needed.

## **EXTENSION AND OUTREACH ACTIVITIES (partial list of recent activities)**

### **Livestock and Poultry Systems – Recent activities include:**

- Certified Livestock Managers Training – an Extension training and certification program for livestock and poultry producers in the state of Illinois. Annually, hosting 10-15 5-h workshops around the state.
- Poultry House Evaluation Service – develop programs for energy efficiency evaluation of broiler housing, specific to housing systems by integrator companies. Produce quarterly newsletters (Cheeps & Chirps). Generalize evaluation findings to each integrator (seven in Kentucky).
- Agricultural Air Quality. Addressing the need for science-based estimates, including evaluating various management strategies. Hosted stakeholder meetings at venues including: individual state poultry association meetings (Kentucky, Iowa, Pennsylvania, and Nebraska), Midwest Poultry Federation, Multi-State Poultry Nutrition Symposium, provide training in Brazil and France, a CIGR-sponsored symposium in Europe in 2003 and EurAGENG in 2004, and Air and Waste Management Symposia in 2003, 2004 and 2005, Virginia Extension agent training 2008.
- Development of algorithms, wiring, installation and testing of TIV control in Kentucky and New York dairy facilities. Successfully convinced the world's largest agricultural environmental controller manufacturer to incorporate the software technology onto their existing products (sales exceeded 50,000 units in 2000).
- Work with Kentucky broiler companies' concerns for young, partially-feathered birds in tunnel ventilation experiencing wind chill. Provided estimate of effective temperature and guidelines for maximum tunnel velocity at different ages of birds. Annually since 1990.
- Troubleshoot and evaluate environment controls in pullet houses with excessive heating bills, condensation and poor indoor air mixing. Provide guidelines and education of fundamentals.
- Evaluate and provide guidelines for daily management of broiler facilities at high elevations in a dry climate, with poor inlet control and significant dust. Developed a simple method for manual inlet adjustment for workers, based on visual inspection of number of fans operating (Maputo, South Africa). 1993.
- Cooperate with colleagues (Drs. Tobin, Harkin) in Gluck Equine Center to develop two systems for Kentucky horse industry. The first is a motion system to assess the efficacy of different drug dose-response via horse activity, rather than blood samples. A second project involves early lameness detection (navicular disease) utilizing a force plate to obtain weight distribution. This latter system was constructed and tested for an M.S. project (C. Holtz). 1999.
- Environmental control in livestock and greenhouse facilities, with Brazilian colleagues, including a signed cooperative exchange agreement between the University of Kentucky and the Federal University of Vicosa (UFV) 2001. Projects with Brazilian agencies and companies including EMBRAPA, Coopervale, and UFV.

### **Greenhouse Engineering**

In cooperation with Professor George Duncan, obtained support from the Kentucky Burley Tobacco Council to improve humidity control in greenhouses used to germinate and grow tobacco transplants. These plants are raised in float trays, and moisture control requires proper adjustment of ventilation and heating systems to balance energy costs, plant hardiness, disease control, and ease of operation. 1999-2004.

- Example automated systems for mechanical and curtain-sided houses were developed and installed in four cooperators facilities (Lincoln, Davies, Shelby [2], and Montgomery counties in Kentucky), and monitored for two years to obtain data on performance, suitability of use, and assess humidity control. 2000-2004.

- Outcomes of the project to date include: an extension fact sheet, a draft video on greenhouse ventilation basics, web-based presentations on greenhouse control for Extension Agent training, development of quizzes for Cooperative Extension County Agent Training, and presentation of findings for both mechanically ventilated and curtain-sided automation.

### **Extension Publications and Presentations**

1. Gates, R.S. 2019. Evaporative cooling pads – maintenance for a longer life. The Ag Engineering Update, Livestock Facilities and Manure Management group, University of Illinois. Available at: [web.extension.illinois.edu/lfmm/eb375/entry\\_13962/](http://web.extension.illinois.edu/lfmm/eb375/entry_13962/)
2. Gates, R.S. 2019. Condensation prevention in metal-walled livestock buildings. Ag Engineering Update, Livestock Facilities and Manure Management group, University of Illinois. Available at: [web.extension.illinois.edu/lfmm/eb375/entry\\_13934/](http://web.extension.illinois.edu/lfmm/eb375/entry_13934/)
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### **Manuscripts in Review**

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### **Manuscripts in Preparation**

1. Xiong, Y., R. S. Gates, T. L. Funk, W. Zheng, M. M. Boddington, and B. T. Lohmar. Challenges for manure management in China.
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## **PROCEEDINGS AND CONFERENCE PAPERS**

1. Latanze, M.P., A. Nicoletti, A.B. Gatsakos, L.W. Steinman, R.S. Gates, K.D. Rausch. 2020. Changes in soybean quality under controlled environmental conditions using a static grain respiration measurement system. Paper No 2000559, 2020 ASABE Annual Intl Mtg (doi: 10.13031/aim.202000559)
2. Cooper, N.C., K.D. Vandepol, M. Ellis, Y. Xiong, R. Gates. 2019. Effect of ddrying of piglets of different birth weights on post-natal changes in rectal temperature. *Pig Welfare Symposium*. (Abstr.)
3. Gates, R.S. 2019. Precision ventilation for swine housing. 5<sup>th</sup> Intl Workshop on Precision Animal Environments (V Workshop Internacional de Ambiente de Precisão). 5-7 November, State University of Campinas, Campinas, SP Brazil.
4. Gates, R.S. and J.L. Purswell 2019. Enhancing resource use efficiency through improved environmental control in poultry housing. 5<sup>th</sup> Intl Workshop on Precision Animal Environments (V Workshop Internacional de Ambiente de Precisão). 5-7 November, State University of Campinas, Campinas, SP Brazil.

5. Gates RS. 2019. Improved food security by understanding quality losses in soybeans harvested under Brazilian conditions. Invited lecture. II SIAPAS/VI SIMCRA (2nd Intl Symp on Env. Engr. For Sustainable Animal Prod; 6th Natl Symp on Struct and Env). 5-7 June, Federal University of Lavras, MG, Brazil. d
6. Xiong, Y., R. S. Gates, and K. W. Koelkebeck. 2019. Interior environment of three laying hen systems during winter conditions. Abstract number: 3217897. Poultry Science Association Annual Meeting. Montreal, QC, Canada, July 14 – 19, 2019. PSA: Champaign, IL.
7. Cooper, N., K. Vandepol, M. Ellis, Y. Xiong, and R. Gates. 2019. Effect of piglet birth weight and drying on post-natal changes in rectal temperature. Annual meeting of the ASAS Midwest Section. Omaha, NE, March 11- 13, 2019. ASAS: Champaign, IL.
8. Cândido, M.G.L., I.F.F. Tinôco, C.F. Souza, L.C.S.R. Freitas, T.C. Santos and R.S. Gates. Estresse na produção animal: revisão de literatura. 2019. II SIAPAS/VI SIMCRA (2nd Intl Symp on Env. Engr. For Sustainable Animal Prod; 6<sup>th</sup> Natl Symp on Struct and Env). 5-7 June, Federal University of Lavras, MG, Brazil.
9. Teles Júnior, C.G.S., R.S. Gates, C.F. Souza, M.O. Vilela. Instrumentação para avaliação da distribuição de temperatura e umidade relativa o ar no interior de instalações avicultura. 2019. II SIAPAS/VI SIMCRA (2nd Intl Symp on Env. Engr. For Sustainable Animal Prod; 6<sup>th</sup> Natl Symp on Struct and Env). 5-7 June, Federal University of Lavras, MG, Brazil.
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11. Oliveira, M.O., R.S. Gates, C.F. Souza, C.G.S. Teles Júnior, H.H.R. Zanetoni and N.A.R. Alzate. Utilização de fluidodinâmica computacional (CFD) na ambiência de instalações avícolas. 2019. II SIAPAS/VI SIMCRA (2nd Intl Symp on Env. Engr. For Sustainable Animal Prod; 6<sup>th</sup> Natl Symp on Struct and Env). 5-7 June, Federal University of Lavras, MG, Brazil.
12. França, L.G.F., R.S. Gates, I.F.F. Tinôco, C.F. Souza and F.C. Sousa. Avaliação das excretas galinhas poedeiras, durante a fase de recria, submetidas a diferentes ambientes térmicos. 2019. II SIAPAS/VI SIMCRA (2nd Intl Symp on Env. Engr. For Sustainable Animal Prod; 6<sup>th</sup> Natl Symp on Struct and Env). 5-7 June, Federal University of Lavras, MG, Brazil.
13. Santos, T.C., R.S. Gates, I.F. Tinôco, S. Zolnier and L.C.S.R. Freitas. Mean surface temperature of Japanese quail exposed to different levels of air velocity and temperature at start of lay. 2019. II SIAPAS/VI SIMCRA (2nd Intl Symp on Env. Engr. For Sustainable Animal Prod; 6<sup>th</sup> Natl Symp on Struct and Env). 5-7 June, Federal University of Lavras, MG, Brazil.
14. Cândido, M.G.L., Xiong, Y., R.S. Gates, I.F.F. Tinôco, and K.W. Koelkebeck. 2018. Application of image analysis to assess the activity of turkey poults exposed to different carbon dioxide concentrations. 2018 PSA Latin American Scientific Conference, 6-8 November, Campinas, SP, Brazil.
15. Xiong, Y., R.S. Gates, N.C. Cooper and M. Ellis. 2018. Neo-natal piglet core body temperature model from surface temperature and environment measurements. Paper ILES18-128, 25-27 September. 10<sup>th</sup> Intl. Livestock Env. Symp, Omaha NE USA.
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23. Pereira da Silva, A.B., M.-G.C. Danao, R.S. Gates and K.D. Rausch. 2018. Dry matter loss and chemical changes to soybeans at 14, 18 and 22% moisture and 30 °C measured in a dynamic grain respiration system. Paper No. 1801406, 29 July – 2 August. ASABE Intl Mtg, Detroit MI USA.
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26. Camilo da Silva, J., J.S. Neves, M.F.A. Vieira, R.S. Gates and I.F.F. Tinôco. 2018. Repostas produtivas de galinhas poedeiras da linhagem DeKalb White em período de altas temperaturas. Presented at XV Seminário Anual de Iniciação Científica da Universidade Federal Rural da Amazônia-Campus Paragominas. 4-7 December 2017.
27. J.S. Neves, J.C. da Silva, M.F.A. Vieira, R.S. Gates and I.F.F. Tinôco. 2017. Desempenho zootécnico de galinhas poedeiras da linhagem Hy-Line W36 em condições de temperaturas elevadas no estado de Minas Gerais. Presented at XV Seminário Anual de Iniciação Científica da Universidade Federal Rural da Amazônia-Campus Paragominas. 4-7 December 2017.
28. Teles Júnior, C.G.S., R.S. Gates, C.F. Souza, I.F.F. Tinôco, F.J.F. Baptista and M.O. Vilela. 2017. Efeito do calor associado a umidade relativa e velocidade do ar na ingestão de água de codornas japonesas. 4-6 September. IX congresso Ibérico de Agroengenharia 2017, Bragança, Portugal.
29. Vilela, M.O., R.S. Gates, C.F. Souza, I.F.F. Tinôco, F.J.F. Baptista, C.G.S. Teles Júnior, K.S.O. Rocha, and D.D. Rosa. 2017. Efeito do calor associado a umidade relativa e velocidade do ar na ingestão de água de codornas japonesas. 4-6 September. IX congresso Ibérico de Agroengenharia 2017, Bragança, Portugal.
30. Pereira da Silva, A.B., M.J. Brantis Junior, L.R. Trevisan, M.-G.C. Danao, R.S. Gates, K.D. Rausch. 2017. Comparison of respiration rates from static and dynamic measurement systems for soybeans at 18% moisture and 35 C. Paper 1700075, 17-19 July. ASABE Intl Mtg, Spokane WA USA.
31. Danao, M.-G.C., A.B. Pereira da Silva, R.S. Gates, K.D. Rausch. Determination of safe grain storage time – a review. Paper 1700075, 17-19 July. ASABE Intl Mtg, Spokane WA USA.
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34. França, L.G.F., R.S. Gates, I.F.F. Tinôco, C.F. Souza. 2017. Analysis of the maximum potential of ammonia emission, from laying hen manure, through the dynamic of systems. EMILI 2017, 21-24 May. St. Malo, France.
35. França, L.G.F., R.S. Gates, I.F.F. Tinôco, C.F. Souza. 2017. Comparison of ammonia emitted by systems for laying hens, with storage of manure and without storage of manure. EMILI 2017, 21-24 May. St. Malo, France.
36. Teles Junior, C.G.S., R.S. Gates, I.F.F. Tinôco, C.F. Souza, M.O. Vilela, C. B. Ferreira, M.G.L. Candido, L.C.S.R. Freitas, R.R.. Andrade. 2016. Nonlinear model for estimating broiler feed consumption as a function of thermal environment and age. 1st Asian Conference on Precision Livestock Farming, 9-11 September. Beijing, China.
37. Teles Junior, C.G.S., R.S. Gates, C.F. Souza, I.F.F. Tinôco, M.O. Vilela, K.P. Oliveira, K.S. O. Rocha., L.C.S. R. Freitas, T.C. dos Santos. 2016. Assessment of feeding behavior of broilers through image analysis. 1st Asian Conference on Precision Livestock Farming, 9-11 September. Beijing, China.
38. Vilela, M.O., R.S. Gates, C.G.S. Teles Junior, C.F. Souza, I.F.F. Tinôco, R.R. Andrade, T.C. dos Santos. 2016. Algorithm for predicting thermal environment for swine in different phases of growth, using Black Globe Temperature-Humidity Index. 1st Asian Conference on Precision Livestock Farming, 9-11 September. Beijing, China
39. Santos, T.C., C.C.S. Carvalho, R.S. Gates, I.F.F. Tinôco, G.C. Silva, T.A. Diniz. 2016. Effect of water basins on concrete floor surface temperature in pens with and without water basins on swine behavior. 1st Asian Conference on Precision Livestock Farming, 9-11 September. Beijing, China
40. Xiong, Y. and R.S. Gates. 2016. Hot weather temperature distribution inside a loaded commercial swine trailer. 1st Asian Conference on Precision Livestock Farming, 9-11 September. Beijing, China
41. Trevisan, L., M.-G.C. Danao K. Sood and R.S. Gates. 2016. Rates of dry matter loss of high moisture soybeans stored at 25 to 45C. Paper No. 16-2461253. Poster, Presented at the Annual International Meeting of the ASABE, Orlando FL. 17-20 July. St. Joseph, MI:ASABE
42. Xiong, Y., W. Zheng, R.S. Gates, K.S.O. Rocha, J.Hu, M.M. Makagon, P.Y. Hester and H.W. Cheng. 2016. Cooled perch system performance for heat stress trials on laying hens: Year 2. Paper No. 16-2460523, Presented at the Annual International Meeting of the ASABE, Orlando FL. 17-20 July. St. Joseph, MI:ASABE
43. Zheng, W., R.S. Gates, K.W. Koelkebeck, Y. Xiong, and A. Green. 2016. Assessing cold weather ventilation using Intelligent Portable Monitoring Units (iPMUs) in a layer barn. Paper No. 16-2460212. Presented at the Annual International Meeting of the ASABE, Orlando FL. 17-20 July. St. Joseph, MI:ASABE
44. Zheng, W., R.S. Gates, Y. Xiong and K.S. Oliveira Rocha. 2016. Design of a portable two-step gas euthanasia system for neonatal pigs. Paper No. 16-202460198. Presented at the Annual International Meeting of the ASABE, Orlando FL. 17-20 July. St. Joseph, MI:ASABE
45. Lu, Y., M. Hayes, R.S. Gates and X. Wang. 2016. Evaluating effect of evaporative cooling and ventilation systems on indoor temperature for modern swine barns. Oral Presentation No. 16-2460311. Presented at the Annual International Meeting of the ASABE, Orlando FL. 17-20 July. St. Joseph, MI:ASABE
46. Yang, S.-J., X. Wang and R.S. Gates. 2016. Numerical economic evaluation on evaporative cooling pad control strategies for mechanically-ventilated growing-finishing swine barn. Paper No. 16-2456704. Presented at the Annual International Meeting of the ASABE, Orlando FL. 17-20 July. St. Joseph, MI:ASABE

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48. Vilela MO, Teles Junior CGS, Oliveira JL, Freitas LCSR, Gates RS, Cândido MGL, Santos TC. 2016. Modelo para a estimativa da temperature de globo negro em função da temperaturae umidade relative do ar. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
49. Vilela MO, Teles Junior CGS, Gates RS, Andrade RR, Oliveira MCTB, Oliveira JL, Arcila JCP. 2016. Algoritmo para predição do ambiente térmico para suínos em diferentes fases de criação, com base no ITGU. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
50. Vilela MO, Gates RS, Tinôco IFF, Teles Junior CGS, Esteves VBL, Morais CV, Rocha KSO. 2016. Influencia do estresse por calor associado a dois niveis de velocidade do ar e duas faixas de umidade relativo no comportamento de codornas Japonesas (*Coturnix coturnix japonica*). 2016. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
51. Teles Junior CGS, Gates RS, Souza CF, Tinôco IFF, Vilela MO, Oliveira KP, Rocha KSO. 2016. Avaliação do comportamento ingestivo de frangos de corte através de análise de imagens digitais. 2016. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
52. Santos TC, Gates RS, Andrade RR, Tinôco IFF, Carvalho CCS, Teles Junior CGS, Vilela MO. 2016. Contribuição dos índices de conforto térmico na produção animal. 2016. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
53. Santos, TC, Carvalho CCS, Gates RS, Andrade RR, Freitas LCSR, Teles Junior CGS, Cândido MGL. Influência da temperatura superficial do piso de concreto em baias com e sem lâmina d'água no comportamento de suínos. 2016. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
54. Rocha KSOR, Gates RS, Zheng W, Xiong Y, Tinôco IFF. Chicken foot pad area measurements, modelling and simulation for thermal perch analyses. 2016. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
55. Zheng W, Gates RS, Koelkebeck KW. Assessing cold weather ventilation using intelligent portable monitoring units (iPMU) in a layer barn. 2016. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
56. Xiong Y, Gates RS. Hot weather temperature distribution inside a loaded commercial swine trailer. 2016. Paper and poster presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
57. Oliveira LGB, Danao MC, Zandonadi RS, Gates RS, Pacheco de Souza A. Pacheco de Souza A. 2015. As variações nas condições de grãos e logística durante o transporte de soja da fazenda para o armazenamento em Sinop, MT. (Variations in soybean harvest conditions and logistics during truck transport from farm to storage in Sinop, Mato Grosso.) Poster. XLIV Congresso Brasileiro de Engenharia Agrícola (CONBEA). São Pedro, São Paulo, Brazil. (Extended abstract)
58. Danao MC, Oliveira LGB, Zandonadi RS, Gates RS, Pacheco de Souza A. 2015. Assessing grain trailer conditions during soybean transport from harvest to storage in Sinop, Mato Grosso, Brazil. Lecture. ASABE Annual International Meeting. New Orleans, Louisiana, USA. (Abstract)
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## **INVITED PRESENTATIONS AND LECTURES**



1. Gates RS. 2019. Improved food security by understanding quality losses in soybeans harvested under Brazilian conditions. Invited lecture. II SIAPAS/VI SIMCRA (2nd Intl Symp on Env. Engr. For Sustainable Animal Prod; 6<sup>th</sup> Natl Symp on Struct and Env). 5-7 June, Federal University of Lavras, MG, Brazil.
2. Gates, R.S. Uncertainty estimates for livestock facility emissions estimates. 2017. Invited lecture, EMILI conference. 21-24 May. St. Malo, France.
3. Gates RS. Overview of animal housing in North America. 2016. Keynote presentation. I SIAPAS/V SIMCRA. Federal University of Viçosa, 7-10 June.
4. Gates, R.S. Feeding behavior and feed consumption of broilers using image analysis. 2016. 1st Asian Conference on Precision Livestock Farming, 9-11 September. Beijing, China.
5. Gates RS. Overview of animal housing in North America. 2016. Keynote presentation. I SIAPAS/V SIMCRA. 7-10 June, Federal University of Viçosa, MG, Brazil.
6. Gates RS. Preferência dos animais – estudo sobre o comportamento animal. Invited presentation, I Congresso de Zootecnia da Precisão 2016, AveSui annual conference, 2-5 May, Florianópolis, Brazil.
7. Gates, R.S. 2015. Sustainable Practices for the U.S. Livestock Industry. Invited presentation, Brazilian Congress of Agrometeorology – CBAgro 2015. 27 August. Lavras, MG, Brazil.
8. Gates, R.S. 2015. Gas and dust emissions from animal production facilities in the USA. Paper and speech. EMILI 2015. 2<sup>nd</sup> International Symposium on Emissions of gas and dust from livestock. 24-26 March, 2015. Florianópolis, SC, Brazil.
9. Gates, R.S. 2015. Animal welfare research: one engineering scientist's perspective. Presented to the Animal Sciences Department Graduate Seminar, 17 April, Purdue University, West Lafayette, IN.
10. Gates, R.S. 2015. Emissão de gases e poeiras na produção pecuária nos Estados Unidos. Presented at 2nd International Symp on Emissions of Gas and Dust from Livestock. 24-26 March, Florianópolis, SC, Brazil.
11. Gates, R.S., T. Funk and Y. Xiong. 2014. The Development of Nutrient Management Practices and Technologies in the U.S. 2014 U.S.-China Swine Industry Symposium: Livestock Nutrient Management-Issues, Policies, and Technology. 12 September. Beijing, PRC.
12. Gates, R.S. 2014. Research and Extension Programs at the U of I. Presented at the annual IRCAEW workshop. 12-14 September, Ha'rbín, PRC.
13. Gates, R.S. 2014. Controladores – Experiência Americana (Controllers – U.S. Experience). Presentation at the Workshop on Controllers and Sensors in Barns, at the AveSui Convention and Trade Show, 15 May, Florianópolis-SC, Brazil.
14. Gates, R.S. on behalf of D.G. Overhults. 2014. Necessidade de Isolamento em Clima Quente (Necessity of Insulation in Hot Climates). Presentation at the Poultry Environment Panel, 14 May, Florianópolis-SC, Brazil.
15. Gates, R.S. 2013. Broilers Dark House Workshop – Metodologias para Mensuração de Gases em Aviários Tipo Túnel (Methods for measuring gases in tunnel ventilated poultry housing). Lecture and paper presented at the 12<sup>th</sup> Poultry and Swine Technical-Scientific Seminar, 15 May. Florianópolis SC, Brazil.
16. Gates, R.S. 2013. Broilers Dark House Workshop – American Experience. Lecture and paper presented at the 12<sup>th</sup> Poultry and Swine Technical-Scientific Seminar, 14 May. Florianópolis SC, Brazil.
17. Gates, R.S. 2012. Preventing postharvest Loss: an initiative at the University of Illinois. Brazilian Conference on Agricultural Engineering (CONBEA). 12 July, Londrina, PR, Brazil

18. Gates, R.S. 2012. Prevenindo a perda pós-colheita: uma iniciativa da University of Illinois. Presented to Brazilian Studies Association (BRASA). 7 September, Urbana, IL.
19. Gates, R.S. 2011. Agricultural and Biological Engineering at the University of Illinois. Faculty and students of the University of Sao Paulo – Pirassununga campus. 4 November.
20. Gates, R.S. 2011. Strategies for cooling in high-density laying hen housing systems. International Symposium on Health, Environment and Animal Welfare. Invited lecture 19-22 October. Chongqing, PRC
21. Gates, R.S. 2011. An engineering perspective on laying hen welfare, with consideration for pigs too. International Symposium on Health, Environment and Animal Welfare. Invited lecture given on behalf of Dr. A.R. Green. 19-22 October. Chongqing, PRC.
22. Gates, R.S. 2011. Agricultural and Biological Engineering at the University of Illinois. Faculty of the University of Florence. 1 June, Florence, Italy. Gates, R.S. 2011. Ag & Biological Engineering: New research trends in bioenvironmental engineering. Invited lecture to University of Florence doctoral students. 31 May, Florence, Italy.
23. Gates, R.S. 2011. Design of new farm buildings: trends in the USA. Invited lecture to University of Florence Agricultural Sciences students. 30 May, Florence, Italy.
24. Gates, R.S. 2009. Plant and animal environmental control for the 21<sup>st</sup> century. Bioproducts and Biosystems Engineering Department Centennial Lecture Series, February 12. University of Minnesota, St. Paul.
25. Management of odors in poultry: overview of U.S. Colombian Poultry Federation, Medellin, Colombia.
26. Gates, R.S. 2008. Emission Measurement Technologies. Invited lecture, National Poultry Waste Management Symposium. 21-23 October, Des Moines IA.
27. Gates, R.S. 2008. U.S. animal feeding operations air emissions mitigation: state of science. Keynote address. Conference on Mitigating Air Emissions from Animal Feeding Operations: Exploring the advantages, limitations, and economics of mitigation technologies. May 19-21. Des Moines, IA.
28. Gates, R.S. 2008. Broiler, turkey and layer building ammonia emissions overview. Presentation, U.S. Poultry and Egg Association Environmental Management Seminar. March 5-6. Atlanta, GA.
29. Gates, R.S. 2006. Recent advances in livestock and poultry production systems. Invited lecture, IV Biometeorology Brazilian Conference. April 11-14. Ribeirão Preto, SP, Brazil.
30. Gates, R.S. and T. Banhazi. 2002. Applicable technologies for controlled environment systems (CES) in livestock production. Presentation, ASAP/ISAH Joint Conference. July 7-11. Adelaide, SA, Australia.
31. Gates, R.S. 2002. Poultry and livestock housing with solid waste management. Presentation, Sixth Discover Conference on Food Animal Agriculture – Nitrogen Losses to the Atmosphere from Livestock and Poultry Operations. April 28-May 1. Nashville IN. American Dairy Science Association: Savoy, IL.
32. Gates, R.S. 2001. Ammonia volatilization as affected by broiler litter rewetting and dietary manipulation. International Symposium addressing animal production and environmental issues.

Research Triangle Park. North Carolina State Animal and Poultry Waste Management Center:  
Raleigh, NC.

33. Gates, R.S. 2001. New tendencies related to life support systems. Keynote Speech (with paper), Agribuildings 2001 Conference. Sponsored by ASAE and CIGR. September. University of Campinas, Campinas, SP, Brazil.
34. Gates, R.S. 2001. Dietary protein and ammonia production in broiler facilities. Invited Lecture, Midwest Poultry Federation Nutrition Symposia. March 13-15. St. Paul, MN.
35. Gates, R.S. 2000. Information technology and computational intelligence in real-time applications. Invited Lecture, Inaugural Session of CIGR Section VII. December. Tsukuba City, Japan.
36. Gates, R.S. 2000. Statistics and modeling concepts for EMMS Data. Instructor, Professional Development Workshop. SE-301 Environmental Physiology (Sponsor). July. ASAE: St. Joseph, MI.
37. Gates, R.S. 2000. Introduction to psychrometric properties and processes. Tech/CPD Seminar for Parameter Generation and Control (PGC), Inc. March. Asheville, NC.
38. Gates, R.S. 2000. Manipulação da Dieta Avícola Considerando a redução na emissão de poluentes ao ambiente (Poultry diet manipulation to reduce output of pollutants to environment). Invited Lecture, sponsored by EMBRAPA. April. Concordia, Brazil.
39. Tuttle, J., R.S. Gates, L.W. Turner, and G.M. Turner. 1989. Heat and moisture production of day old leghorn-type chicks. Presentation, 78th Annual Meeting of the Poultry Science Association, Madison, WI. July 25-28.

## **OTHER PUBLICATIONS AND REPORTS**

1. Colliver, D., J. Bush, A. Davis, M. Montross, R. Fehr, R. Gates, G. Halich, and S. Nokes. 2008. Kentucky resources to meet energy needs of the 25'x25 Initiative. Biosystems and Agricultural Engineering No. AEN-93, University of Kentucky: Lexington, KY.
2. Zhang, H., R.S. Gates and D.G. Colliver. 1995. Development and documentation of a psychrometric Turing machine. Department of Biosystems and Agricultural Engineering, Agricultural Experiment Station Paper No. RIS 95-10. University of Kentucky: Lexington, KY.
3. Colliver, D.G., H. Zhang, R.S. Gates, and T.K. Priddy. 1994. Design data for the 1%, 2 1/2% and 5% occurrences of extreme dew-point temperature, with area coincident dry-bulb temperature. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE). Project ASHRAE 754-RP, Volumes 1, 2 and 3 Draft Final Report. Approximately 900 pages.
4. Burks, T.F., L.W. Turner, W.L. Crist, J.L. Taraba, and R.S. Gates. 1988. Simulating cow throughput and labor efficiency in the dairy parlor. Dairy Research Report, University of Kentucky, College of Agriculture, Agricultural Experiment Station: Lexington, KY.