

Hongwei Xin, Ph.D.

Assistant Dean for Research, College of Agriculture and Life Sciences
Interim Director, Iowa Nutrient Research Center
Director of Egg Industry Center, Iowa Egg Council Endowed Professor
Charles F. Curtiss Distinguished Professor of Ag & Biosystems Engineering and Animal Science
1202 NSRIC, Iowa State University, Ames, Iowa 50011-3310, USA
Office: (+1) 515-294-4240; Mobile: (+1) 515-450-2593; Fax: (+1) 515-294-5231; hxin@iastate.edu
Faculty website: <http://www.abe.iastate.edu/hongwei-xin/>
Citation Indices: <http://scholar.google.com/citations?user=l02uQPAAAAAJ&hl=en>

EDUCATION

Ph.D.	Engineering (Bio-environmental Engineering Field), University of Nebraska (Dissertation Advisor: Dr. James A. DeShazer)	1989
M.S.	Agricultural Engineering, University of Nebraska (Thesis Advisor: Dr. James A. DeShazer)	1985
B.S.	Agricultural Engineering, Shenyang Agricultural University, China	1982

PROFESSIONAL EXPERIENCE

2017.04–present *Assistant Dean for Research*, College of Agriculture and Life Sciences, ISU
2017.04–present *Interim Director*, Iowa Nutrient Research Center, CALS, ISU
2014.05–present *Charles F. Curtiss Distinguished Professor*, ISU
2013.10–present *Iowa Egg Council Endowed Professor*, ISU
2011.09–2013.07 *Associate Chair for Research* of Agricultural and Biosystems Engineering, ISU
2008.08–present *Director*, Egg Industry Center located at ISU
2002.07–present *Professor*, Department of Agricultural and Biosystems Engineering, ISU
2002.07–present *Professor*, courtesy appointment of Animal Science, ISU
1998.07–2002.06 *Associate Professor*, Department of Agricultural and Biosystems Engineering, ISU
1993.12–1998.06 *Assistant Professor*, Department of Agricultural and Biosystems Engineering, ISU
1990.06–1993.11 *Post-doctoral Research Associate*, Dept. of Biological and Agricultural Engineering, University of Arkansas, Fayetteville, Arkansas
1990.01–1990.05 *Post-doctoral Research Associate*, Dept. of Biological Systems Engineering, University of Nebraska-Lincoln (UNL), Lincoln, Nebraska
1984.01–1989.12 *MS and PhD Graduate Research Assistant*, Dept. of Agricultural Engineering, UNL
1982.09–1983.12 *Instructor*, Dep. of Agricultural Engineering, Shenyang Agricultural University, China

ADMINISTRATION, RESEARCH AND OUTREACH PROGRAMS

Administration: As CALS Assistant Dean for Research, Dr. Xin is a member of the Dean's Leadership team and works directly with the Senior Associate Dean in providing the direction and support for the research enterprise of the College. He focuses on promotion of animal-related research; facilitates linkages between the College and Experiment Station research and economic development; and supports international research partnerships. As director of the Egg Industry Center, Dr. Xin oversees the operation of the center that has the mission of adding values to the egg industry by facilitating research and learning for egg producers, processors and consumers through national and international collaborations.

Research and Outreach Programs: Air quality related to animal feeding operations with emphasis on measurement and mitigation of aerial emissions; animal-environment interactions with regards to bioenergetics, animal behavior and well-being, physiology, and production performance; housing systems and environment control for livestock and poultry production; and precision livestock farming (PLF).

AWARDS AND HONORS

- Iowa State University International Service Award (2017)
- Invited participant of the National Academies of Science, Engineering and Medicine (NASEM) Jamboree Workshop on Science Breakthroughs 2030: *A Strategy for Food and Agricultural Research*, Oct. 2-4, 2017, Irvine, CA, USA
- Member of Advisory Panel for World Wildlife Fund Study on Canadian Egg Sustainability (2017)
- Member of Advisory Panel for World Wildlife Fund Study on U.S. Egg Sustainability (2017)
- External examiner of a PhD thesis (Stefano Vizzo) at Catholic University of Leuven, Belgium (2017)
- Featured in “Retaking the Field” Strengthening the Science of Farm and Food Production – *Clearing the air in a cage-free production system* (pp12-13). The Supporters of Agricultural Research (SoAR) Foundation, Volume 2, March 2017.
- Deputy Director of International Experts Committee, National Alliance for Technological Innovation on Animal Manure Resource Management, Ministry of Agriculture, China (2017-2018)
- An invited member of 24-member United Egg Producers Strategic Planning Committee (2017)
- The Henry Giese Structures and Environment Award of the American Society of Agricultural and Biological Engineers (ASABE) (2016)
- The Distinguished Career Award of the Association of Overseas Chinese Agricultural and Biological Engineers (AOCABFE) (2016)
- ISU College of Agriculture and Life Sciences Dean’s Citation for Extraordinary Contributions Award (for timely responses to the 2015 high pathogenic avian influenza outbreaks) (2016)
- Invited external examiner of a PhD thesis and defense (Albert Winkel) at Wageningen University, The Netherlands (2016)
- Invited member of the Assessment Committee for a Precision Livestock Farming faculty search at the Catholic University of Leuven, Belgium, appointed by the KU Leuven Academic Board (2016)
- Gamma Sigma Delta – The Honor Society of Agriculture, Iowa State University Chapter’s Extension Award of Merit (2016)
- A founding member of the Global Expert Group on Avian Influenza, International Egg Commission headquartered in London, United Kingdom (2015–)
- A founding member of the Global Roundtable for Sustainable Egg Production, International Egg Commission headquartered in London, United Kingdom (2015–)
- Charles F. Curtiss Distinguished Professor, Iowa State University (2014)
- USPOULTRY 2014 Workhorse of the Year Award (2014)
- Technical Paper Award by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) (2014)
- Iowa Egg Council Endowed Professor (2013–present)
- Appointed by the U.S. Secretary of Agriculture to the USDA Agricultural Air Quality Task Force (AAQTF) (2008–2010, 2011–2013, 2013–2015)
- Elected to the ISU Osborn Research Club (2013)
- Iowa State University College of Engineering Superior Extension Award (2012)
- Foreign Member of the Scientific Advisory Committee for the Science and Information Centre for Sustainable Poultry Industry [Wissenschafts-und Informationszentrum Nachhaltige Geflügelwirtschaft – WING)], Raum, Germany (2012–present)
- Overseas Chair for Board of Directors, International Research Center for Animal Environment and Welfare headquartered at Chongqing Academy of Animal Sciences, China (2012–2016; 2016–2020)
- Member of the United Egg Producers (UEP) Ammonia Task Force (2013–present)
- Member of the UEP Scientific Advisory Committee on Animal Welfare (2012–present)
- Member of the Scientific Advisory Committee for the Key Laboratory of Energy Conservation and Waste Management of Agricultural Structures, Ministry of Agriculture, China (2012–2017)
- Member of the Scientific Advisory Committee for the State Key Laboratory in Animal Nutrition (SKLAN), the Chinese Academy of Agricultural Sciences, Beijing, China (2011–2016)

- Member of the Scientific Advisory Committee for the Key Laboratory on Agricultural Structures and Environment, China Agricultural University, Beijing, China (2008–2011, 2011–2015)
- Midwest Poultry Consortium Outstanding Service Award (2011) (Past recipients include Dr. Dennis Casey, Former President of Hy-Line International; Mr. Bob Sparboe, Founder and President of Sparboe Company; the Honorable Tom Harkin, U.S. Senator; the Honorable Tom Latham, U.S. Congressman; Dr. Wendy Wintersteen, Endowed Dean; Dr. Susan Lamont, Distinguished Professor)
- Educational Materials Award – Certificate of Excellence by the Council for Agricultural Science and Technology for creation of educational material “*Air Issues Associated with Animal Agriculture: A North American Perspective*” (2011)
- Iowa State University Award for Outstanding Achievement in Research (2010)
- ISU CALS Outstanding Achievement in International Agriculture Award (2010)
- Guest Professor, College of Biosystems Engineering & Food Science, Zhejiang University, China (2010–present)
- Appeared in the History Channel show “*The Modern Marvels: Eggs*” (First aired Jan 20, 2010)
- Invited to the “Mission 2050 Think Tank, *Net Zero: Emissions, Water & Energy*” sponsored by the Ontario Ministry of Agriculture, Food and Rural Affairs, and University of Guelph, Canada (2009)
- President’s Citation Award, the American Society of Ag. and Biological Engineers (ASABE) (2009)
- ISU College of Agriculture and Life Sciences Outstanding Research Award (2009)
- Appointment to Director of the Egg Industry Center (2008–present)
- Project Director of the Midwest Poultry Research Program (2008–2013)
- Inducted to Fellow of the American Society of Agricultural and Biological Engineers (2008)
- ISU College of Engineering David R. Boylan Eminent Faculty Research Award (2008)
- Appointment of Adjunct Professor of China Agricultural University, Beijing, China (2008–present)
- Iowa Poultry Association 2007 Industry Person of the Year Award (2007)
- Chair of the United Egg Producers Environmental Scientific Panel on Air Emissions (2004–present)
- Member of the USDA-NRI Air Quality Program Review Panel (2007–2012)
- U.S. Member of Scientific Board for SMART 2006 Conference, Brescia, Italy (2005-2006)
- Honorary Scientist of the Rural Development Administration of the Republic of Korea (2004-2006)
- Member of EPA National Air Emission Study Planning Committee (2003–2004)
- New Holland Young Researcher Award of the ASAE/ASABE (2001)
- Young Member of the Year Award, Mid-Central Section of the ASAE/ASABE (2001)
- Young Engineer of the Year Award, Iowa Section of the ASAE/ASABE (2001)
- Representing ASABE at the Installation Ceremony of ISU 14th President Gregory Geoffroy (2001)
- Research Award for Foreign Expert, Ministry of Agriculture, Forestry and Fisheries, Japan (2000)
- Featured in the ISU Campaign “*Advancing Technology to Become the Best*” (2000)
- Invited member of USDA CSREES delegation to China for assessing environmental issues related to intensive animal production (2000)
- ASABE Paper Awards (12)
 - Seven Superior Paper Awards (1997[2], 2000, 2005[2], 2015, 2017) (top 2.5% published articles)
 - Five Honorable Mention Awards (1998, 2001, 2002, 2003, 2009) (top 5% of published articles)
- Newcomer Engineer of the Year Award, Iowa Section of the ASAE (1997)
- Honorary Professor of the Chinese Academy of Agricultural Sciences (1998)
- Honorary Professor of China Agricultural University (1996)
- ASAE Educational Blue Ribbon Award (1995)
- Invited speaker at 50+ national conferences/workshops (USDA, ASAS, ASSP, Midwest Poultry Federation, American Egg Board, United Egg Producers, U.S. Poultry and Egg Association, National Turkey Federation, National Poultry Waste & Management Symposium; Minnesota Turkey Research and Promotion Council; Hy-Line International, Pennsylvania State University, The Ohio State University) and 60+ international conferences/workshops (Belgium – multiple times, Brazil – multiple times, Canada – multiple times, China – multiple times, Columbia, Costa Rica – multiple

times, Denmark, France – multiple times, Germany, Italy, Japan – multiple times, Mexico – multiple times, The Netherlands – multiple times, Spain, United Kingdom – multiple times)

- Sigma Xi Scientific Research Society Travel Award (1987)
- University of Nebraska Widaman Trust Distinguished Graduate Student Award (1986)

PROFESSIONAL MEMBERSHIPS

- American Society of Agricultural and Biological Engineers (ASABE) – *Lifetime Member*
 - Elected to the Grade of Fellow (2008)
- Committees Served & Offices Held:
 - Organizing Committee of the 10th International Livestock Environment Symposium (2016–2018)
 - Organizing Committee of the 9th International Livestock Environment Symposium (2011–2012)
 - Program Chair of the 8th International Livestock Environment Symposium (2006–2008)
 - Structure and Environment (SE) Division Program Chair (2003–2005)
 - Associate Editor of SE Division (1994–2004; 2009–2013)
 - Meetings Council – SE Representative (2003–2005)
 - Publications Council – Member at large (2003–2005)
 - Planning Committee for the 7th International Livestock Environment Symposium (2002–2005)
 - Publications Council - SE Representative (1999–2002)
 - P-511 Refereed Publications, SE Liaison (1996–1999)
 - SE-04 Paper Awards (Chair, 1996; Vice Chair, 1995; Secretary, 1994)
 - SE-05 Publication Review (1995–2004)
 - SE-301 Environmental Physiology (Chair, 1996; Vice Chair, 1995; Secretary, 1994)
 - SE-302 Environment of Animal Structures (Chair, 1999; Vice Chair, 1998; Secretary, 1997)
 - SE-404 Swine Housing (member, 1990 - present)
 - SE-405 Poultry Housing (Chair, 2001; Vice Chair, 2000; Secretary, 1999)
 - Vice Chair Membership of the Iowa Section of ASAE (2000–2001)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
 - Chair of TC 2.2 Handbook Committee (2000–2003)
- Alpha Epsilon Honor Society of Agricultural Engineers
- Association of Overseas Chinese Agricultural, Biological and Food Engineers
 - Vice President (2003-2004)
- Gamma Sigma Delta – The Honor Society of Agriculture
- Poultry Science Association
 - Chair of Animal Welfare Session for the 2016 Annual Meeting in New Orleans, LA
- Sigma Xi Scientific Research Society

PUBLICATIONS

Refereed Journal Articles (in chronological and alphabetical order. * Dr. Xin was first author's mentor)

1. Chai*, L., Y. Zhao, **H. Xin**, T. Wang, A. Atilgan, M. Soupier, and K. Liu. 2017. Reduction of particulate matter and ammonia by spraying acidic electrolyzed water onto litter of aviary hen houses – a lab-scale study. *Transactions of the ASABE* 60(2):479-506. DOI 10.13031/trans.12081
2. Chai*, L., Y. Zhao, **H. Xin**, T. Wang, M. Soupier, and K. Liu. 2017. Mitigating ammonia and PM generations of cage-free henhouse litter with solid additive and liquid spray. *Transactions of the ASABE* (accepted for publication)
3. Harmon, J.D., S.J. Hoff, T.J. Baas, Y. Zhao, **H. Xin**, and L.R. Follet. Evaluation of conditions during weaned pig transport. *Applied Engineering in Agriculture* (accepted for publication)

4. Li*, L., Y. Zhao, J. Oliveira, W. Verhoijesen, and **H. Xin**. 2017. A UHF RFID system for studying individual feeding and nesting behaviors of group-housed laying hens. *Transactions of the ASABE* 60(4): 1337-1347. <https://doi.org/10.13031/trans.12202>
5. Lin, X., R. Zhang, S. Jiang, H. El-Mashad, and **H. Xin**. 2017. Emissions monitoring of ammonia, carbon dioxide and particulate matters in two Californian cage-free layer houses. *Atmospheric Environment* 152(2017):246-255. <http://dx.doi.org/10.1016/j.atmosenv.2016.12.018>
6. Liu*, K., **H. Xin**, J. Sekhon, T. Wang. 2017. Effect of Fluorescent vs. Poultry-specific light-emitting diode lights on production performance and egg quality of W-36 laying hens. *Poultry Science* (accepted)
7. Liu*, K. and **H. Xin**. 2017. Effects of horizontal distance between perches on perching behavior of Lohmann hens. *Appl. Animal Behaviour Sci.* <https://doi.org/10.1016/j.applanim.2017.05.001>
8. Liu*, K. **H. Xin**, and L. Chai. 2017. Choice between LED and fluorescent lights by pullets and laying hens. *Transactions of the ASABE* 60(6): in press
9. Liu*, K. **H. Xin**, and P. Settar. 2017. Effects of a commercial LED light versus a typical CFL light on growing performance and activity levels of W-36 pullets. *Animal* <http://dx.doi.org/10.1017/S1751731117001240>
10. Lu, Y., M. Hayes, J.P. Stinn, T.M. Brown-Brandl, **H. Xin**. 2017. Evaluating ventilation rates based on new heat and moisture production data for swine production. *Transactions of the ASABE* 60(1):237-245. DOI 10.13031/trans.11888
11. Ponciano, P.F., T. Yanagi, Jr., **H. Xin**. 2017. Performance of chicks subjected to thermal challenge. *Pesq. agropec. bras.* 52(2), doi.org/10.1590/s0100-204x2017000200005
12. Shepherd*, T.A., **H. Xin**, J.P. Stinn, M.D. Hayes, Y. Zhao, and H. Li. 2017. Ammonia and carbon dioxide emissions of three laying-hen housing systems as affected by manure accumulation time. *Transactions of the ASABE* 60(1):229-236. (doi: 10.13031/trans.11860)
13. Wang, Y., H. Dong, Z. Zhu, P.J. Gerber, **H. Xin**, P. Smith, C. Opio, H. Steinfeld, and D. Chadwick. 2017. Mitigating greenhouse gas and ammonia emissions from swine manure management: a system analysis. *Environ. Sci. Technol.* DOI: 10.1021/acs.est.6b06430
14. **Xin, H.** and K. Liu. 2017. Precision livestock farming in egg production. *Animal Frontier* 7(1): 24-31.
15. Zhao*, Y., L. Chai, B.J. Richardson, and **H. Xin**. 2017. Field Evaluation of an electrostatic air filtration system for reducing incoming particulate matter of a hen house. *Transactions of the ASABE* (accepted for publication)
16. Chen, H. **H. Xin**, G. Teng, C. Meng, X. Du, T. Mao, and C. Wang. 2016. Cloud-based data management system for automatic real-time data acquisition from large-scale laying-hen farms. *Int J Agric & Biol Eng* 9(4):106-115. doi: 10.3965/j.ijabe.20160904.2488
17. Lao*, F. T.M. Brown-Brandl, J.P. Stinn, K. Liu, G. Teng, and **H. Xin**. 2016. Automatic recognition of lactating sow behaviors through depth image processing. *Computers and Electronics in Agriculture* 125:56-62. doi.org/10.1016/j.compag.2016.04.026
18. Long*, H., Y. Zhao, T. Wang, Z. Ning, and **H. Xin**. 2016. Effect of light-emitting diode (LED) vs. fluorescent lighting (FL) on laying hens in aviary hen houses: Part 1 – Operational characteristics of lights and production traits of hens. *Poultry Science* 95(1):1-11. doi.org/10.3382/ps/pev121
19. Long*, H., Y. Zhao, **H. Xin**, H. Hansen, Z. Ning, and T. Wang. 2016. Effect of light-emitting diode (LED) vs. fluorescent (FL) lighting on laying hens in aviary hen houses: Part 2 – Egg quality, shelf life and lipid composition. *Poultry Sci.* 95(1):115-124. doi.org/10.3382/ps/pev306
20. Ma*, H., **H. Xin**, Y. Zhao, B. Li, T.A. Shepherd, and I. Alvarez. 2016. Assessment of lighting needs by W-36 laying hens via preference test. *Animal* 10(4): 671-680. doi.org/10.1017/S1751731115002384

21. Roberts*, S.A., **H. Xin**, R. Swestka, M. Yum, and K. Bregendahl. 2016. Spatial variation and sampling strategy of manure nutrients in high-rise laying-hen houses. *J. App. Poult. Res.* doi.org/10.3382/japr/pfw013
22. Zhao*, Y., D. Zhao, H. Ma, K. Liu, A. Atilgan, **H. Xin**. 2016. Environmental assessment of three egg production systems – Part III: airborne bacteria concentrations and emissions. *Poultry Sci.* 1-9. doi.org/10.3382/ps/pew053
23. Zhao*, Y., **H. Xin**, J.D. Harmon, and T.J. Baas. 2016. Mortality rate of weaned and feeder pigs as affected by ground transportation conditions. *Transactions of the ASABE* 59(4):943-948. DOI 10.13031/trans.59.11671 (**Superior Paper Award**)
24. Hansen, H., T. Wang, D. Dolde, and **H. Xin**. 2015. Tocopherol and annatto tocotrienols distribution in laying-hen body. *Poultry Sci.* 94(10):2421-2433. doi.org/10.3382/ps/pev228
25. Hansen, H., T. Wang, D. Dolde, **H. Xin**, and K. Prusa. 2015. Supplementation of laying-hen feed with annatto tocotrienols and impact of α -tocopherol on tocotrienol transfer to egg yolk. *J. Agric. Food Chem.* 63(9):2537-2544. doi.org/10.1021/jf505536u
26. Karcher, D.M., D.R. Jones, Z. Abdo, Y. Zhao, T.A. Shepherd, and **H. Xin**. 2015. Impact of commercial housing system and nutrition and energy intake on laying hen performance and egg quality parameters. *Poultry Science* 94(3):485-501.
27. Li, H., C. Zhang and **H. Xin**. 2015. Performance of an infrared photoacoustic single gas analyzer in measuring ammonia from poultry houses. *Applied Engineering in Agriculture* 31(3):471-477.
28. Shepherd*, T.A., Y. Zhao, H. Li, J.P. Stinn, M.D. Hayes, and **H. Xin**. 2015. Environmental assessment of three laying-hen housing systems– Part II: ammonia, greenhouse gas, and particulate matter emissions. *Poultry Science* 94(3):534-543.
29. Wang, Y, H. Dong, Z. Zhu, L. Li, T. Zhou, B. Jiang, **H. Xin**. 2015. CH₄, NH₃, N₂O and NO emissions from stored biogas digester effluent of pig manure at different temperatures. *Agriculture, Ecosystems & Environment* doi:10.1016/j.agee.2015.10.020
30. Zhao*, Y., T. A. Shepherd, J. Swanson, J. A. Mench, D.M. Karcher, and **H. Xin**. 2015. Comparative evaluation of three laying-hen housing systems: description of the production systems and management practices. *Poultry Science* 94(3): 475-484.
31. Zhao*, Y., T.A. Shepherd, T.A., H. Li, J.P. Stinn, M.D. Hayes, and **H. Xin**. 2015. Environmental assessment of three laying-hen housing systems–Part I: monitoring system and indoor air quality. *Poultry Science* 94(3): 518-533.
32. Brown-Brandl, T.M, M.D. Hayes, **H. Xin**, J.A. Nienaber, H. Li, R.A. Eigenberg, J.P. Stinn, and T.A. Shepherd. 2014. Heat and moisture production of modern swine. *Transactions of the ASHRAE* 120(1):469-489 (ASHRAE Technical Paper Award).
33. Hayes*, M.D. **H. Xin**, H. Li, T. A. Shepherd, and J. P. Stinn. 2014. Electricity and fuel usage of aviary layer houses in the Midwestern USA. *Applied Engineering in Agriculture* 30(2): 259-266.
34. Kang, J., T. Wang, **H. Xin**, and Z. Wen. 2014. A laboratory study of mitigating ammonia gas emission from animal production operations using microalgae. *J. Air and Waste Management Association* 64(3):330-339.
35. Mendes*, L.B., **H. Xin**, J.W. Nascimento, and H. Li. 2014. Evaluation of a soil moisture sensor for real-time measurement of poultry manure or litter moisture content. *Applied Engineering in Agriculture* 30(2):277-284.
36. Nakarmi*, A., L. Tang, and **H. Xin**. 2014. Automated tracking and behavior quantification of laying hens using 3D computer vision and radio frequency identification technologies. *Transactions of the ASABE* 57(5):1455-1472.
37. Pelletier, N., M. Ibarburu, and **H. Xin**. 2014. Comparative assessment of the environmental footprint of the U.S. egg industry in 1960 and 2010. *Poultry Science* 93:241-255 (invited review)

38. Stinn*, J.P. and **H. Xin**. 2014. Heat and moisture production rates of a modern U.S. swine breeding-gestation-farrowing facility. *Transactions of the ASABE* 57(5): 1517-1528 (**Superior Paper Award**).
39. Stinn*, J.P. **H. Xin**, T.A. Shepherd, H. Li, and R.T. Burns. 2014. Ammonia and greenhouse gas emissions of a modern U.S. swine breeding-gestation-farrowing system. *Atmospheric Environment* 98(2014):620-628.
40. Tao, X., B. Shang, H. Dong, Y. Chen, and **H. Xin**. 2014. Effects of digestate from swine manure digester on in vitro growth of crop fungal pathogens: a laboratory study. *Transactions of the ASABE* 57(6):1803-1810.
41. Wang, Y., H. Dong, Z. Zhu, C. Liu, and **H. Xin**. 2014. Comparison of greenhouse gas and ammonia emissions during storage of raw liquid pig manure and biogas digester effluent. *Transactions of the ASABE* 57(2):635-645.
42. Wang, Y., H. Dong, Z. Zhu, T. Li, K. Mei, and **H. Xin**. 2014. Ammonia and greenhouse gas emissions from biogas digester effluent stored at different depths. *Transactions of the ASABE* 57(5):1483-1491.
43. Zhao, Y., A. Aarnink, and **H. Xin**. 2014. Inactivation of airborne *Enterococcus faecalis* and infectious bursal disease virus using a pilot-scale ultraviolet photocatalytic oxidation scrubber. *Journal of the Air & Waste Management Association* 64(1):38-46.
44. Zhao*, Y., **H. Xin**, D. Zhao, W. Zheng, W. Tian, H. Ma, K. Liu, H. Hu, T. Wang, M.L. Soupier. 2014. Free chlorine loss during spray of membrane-less acidic electrolyzed water and its antimicrobial effect on airborne bacteria from poultry house. *Annals of Agricultural and Environmental Medicine* 21(2):249-255.
45. Zheng*, W., Y. Zhao, **H. Xin**, B. Li, R.S. Gates, Y. Zhang and M.L. Soupier. 2014. Airborne particulate matter and bacteria reduction from spraying slightly acidic electrolyzed water in an experimental aviary laying-hen housing system. *Transactions of the ASABE* 57(1):229-236.
46. Zhu, Z., H. Dong, J. Xi, and **H. Xin**. 2014. Ammonia and greenhouse gas emissions from co-composting of dead hens with manure as affected by forced aeration rate. *Transactions of the ASABE* 57(1):211-217.
47. Hayes*, M.D. **H. Xin**, H. Li, T. A. Shepherd, Y. Zhao, and J. P. Stinn. 2013. Heat and moisture production of Hy-Line brown hens in aviary houses in the Midwestern United States. *Transactions of the ASABE* 56(2):753-761.
48. Hayes*, M.D. **H. Xin**, H. Li, T.A. Shepherd, Y. Zhao, and J. P. Stinn. 2013. Ammonia, greenhouse gas, and particulate matter concentrations and emissions of aviary layer houses in the Midwestern USA. *Transactions of the ASABE* 56(5):1921-1932.
49. Na, R., H. Dong, Z. Zhu, Y. Chen, and **H. Xin**. 2013. Effects of forage type and concentrate-to-forage ratio on methane emission and rumen fermentation characteristics of dairy cows in China. *Transactions of the ASABE* 56(3): 1115-1122.
50. Pelletier, N., M. Ibarburu, and **H. Xin**. 2013. A carbon footprint analysis of egg production and processing supply chains in the Midwestern United States. *J. Cleaner Production* 54(2013):108-114.
51. Trabue, S.L., K. Scoggin, H. Li, R.T. Burns, **H. Xin**, L. McConnell, R.S. Gates, A. Hasson, S. Ogunjemiyo, and J. Hatfield. 2013. Performance of commercial non-methane hydrocarbon analyzers in monitoring oxygenated volatile organic compounds emitted from animal feeding operations. *Journal of the Air & Waste Management Association* 63(10):1163-1172.
52. Zhao*, Y., **H. Xin**, and B. Dong. 2013. Use of infrared thermography to assess laying-hen feather coverage. *Poultry Science* 92(2):295-302.
53. Zhao*, Y., **H. Xin**, T.A. Shepherd, M.D. Hayes, J.P. Stinn. 2013. Modeling ventilation, balance temperature and supplemental heat requirement in alternative versus conventional laying-hen housing systems. *Biosystems Engineering* 115(2013):311-323.

54. Zhao*, Y., **H. Xin**, T.A. Shepherd, M.D. Hayes, J.P. Stinn, and H. Li. 2013. Thermal environment, ammonia concentrations and ammonia emissions of aviary houses with white laying hens. *Transactions of the ASABE* 56(3):1145-1156.
55. Zheng*, W., Y. Zhao, **H. Xin**, B. Li, R.S. Gates, Y. Zhang and M.L. Soupir. 2013. Concentrations and size distributions of airborne particulate matter and bacteria in an experimental aviary laying-hen setting. *Transactions of the ASABE* 56(6):1493-1501.
56. Chepete*, J.H., **H. Xin**, and H. Li. 2012. Effect of partially covering turkey litter surface on ammonia emission. *J. App. Poult. Res.* 21:521-529.
57. Chepete*, J.H., **H. Xin**, H. Li, L. Mendes, and T. Bailey. 2012. Ammonia emission and performance of laying hens as affected by different dosages of yucca schidigera. *J. App. Poult. Res.* 21:530-538.
58. Li*, H., **H. Xin**, R. T. Burns, S.A. Roberts, S. Li, J. Kliebenstein, and K. Bregendahl. 2012. Reducing ammonia emissions from high-rise laying-hen houses through dietary manipulation. *J. Air and Waste Management Association* 62(2):160-169.
59. Mendes*, L.B., **H. Xin** and H. Li. 2012. Ammonia emissions of pullets and laying hens as affected by stocking density and manure accumulation time. *Transactions of the ASABE* 55(3):1067-1075.
60. Rahman*, S., **H. Xin**, S.A. Roberts, J.A. Arthur, R.T. Burns, H. Li, Z. Zhu, L.B. Moody, and K. Bregendahl. 2012. Effects of laying-hen variety on manure properties and ammonia emission. *Transactions of the ASABE* 55(3):105-1065.
61. Tao, X., H. Dong, H. Zhang, and **H. Xin**. 2012. Sex-based responses of plasma creatine kinase in broilers to thermoneutral constant and cyclic high temperatures. *British Poult. Sci.* 52(6):800-806.
62. Walker, L., T. Wang, **H. Xin**, and D. Dolde. 2012. Supplementation of laying-hen feed with palm tocos and algal astaxanthin for egg yolknutrient enrichment. *J. Agric. Food Chem.* 60:1989-1999.
63. Zhu*, Z., **H. Xin**, H. Li, and H. Dong. 2012. Assessment of tubing type on ammonia gas adsorption. *Applied Engineering in Agriculture* 28(2):265-269.
64. Chepete*, J.H., **H. Xin**, and H. Li. 2011. Technical Note: Heat and moisture production of W-36 laying hens at 24 to 27 °C temperature conditions. *Transactions of the ASABE* 54(4):1491-1493.
65. Chepete*, J.H., **H. Xin**, and H. Li. 2011. Ammonia emissions of laying hen manure as affected by accumulation time. *J. Poult. Sci.*, 48:138-143.
66. Davis*, J.D., M.J. Darr, **H. Xin**, J.D. Harmon and J.R. Russell. 2011. Development of a GPS herd activity and well-being kit (GPS HAWK) to monitor cattle behavior and the effect of sample interval on travel distance. *Applied Engineering in Agriculture* 27(1):143-150.
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Books and Book Chapters

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279. **Xin, H.** 1996. Responses of neonatal chicks to post-hatch environment. In: Proc. of the International Conference on Agricultural and Bioenvironmental Engineering held in Beijing, China, August 15-19, 1996, ppIII-19~26.
280. Harmon, J.D., R. Zhang, and **H. Xin**. 1994. Human health concerns in livestock and poultry housing. In: Proc. of 1994 National Poultry Waste Management Symposium held at Atlanta, Georgia, (Eds) P.H. Patterson and J.B. Blake, pp31-42.
281. DeShazer, J.A., M.J. Milanuk, D.L. Watt, **H. Xin**, B. Vansteelant, and R.C. Ewan. 1988. NCCISWINE: The environment and housing component. In: Proc. of the 3rd International Livestock Environment Symposium, May 25-27, 1988, Toronto, ON, Canada, pp203-210.

282. **Xin, H.**, J.A. DeShazer, and D.W. Leger. 1988. Swine vocalization under selected husbandry practices. In: Proc. of the 3rd International Livestock Environment Symposium, May 25-27, 1988, Toronto, Ontario, Canada, pp336-342.

Invited Articles, Lectures, and Presentations

283. **Xin, H.** 2017. Ventilation for broiler and layer housing. An invited presentation at the Third International Workshop on Precision Animal Environment Control, November 6-9, 2017; UNICAMP, Campinas, Brazil.
284. **Xin, H.** 2017. Behavioral and performance responses of pullets and layers to fluorescent and poultry-specific LED lighting. An invited presentation at the Third International Workshop on Precision Animal Environment Control, November 6-9, 2017; UNICAMP, Campinas, Brazil.
285. **Xin, H.** 2017. Technology will advance animal wellbeing. An invited presentation at the 7th Annual Symposium on Current Issues and Advances in Food Animal, August 3, 2017, University of Arkansas, Fayetteville, AR, USA.
286. **Xin, H.** 2017. Animal welfare and egg production sustainability. An invited keynote presentation at the 54th Brazilian Society of Animal Science Annual Meeting, July 24-28, 2017, Foz de Iguacu, Brazil
287. **Xin, H.** 2017. Towards precision livestock farming. An invited presentation to the Plant Animal Facility Systems Distinguished Lecture at the 2017 ASABE Annual International Meeting, July 16-19, 2017, Spokane, WA, USA
288. **Xin, H.** 2017. American egg industry at a crossroads. An invited presentation at the 2017 Urban Ag Academy Conference, The Gateway Hotel and Conference Center, July 13, 2017, Ames, IA, USA
289. **Xin, H.** 2017. Housing and environment control for egg production. An invited presentation at the 2017 Hy-Line International Technical School, West Des Moines Sheraton Hotel, June 12-15, 2017, West Des Moines, IA, USA
290. **Xin, H.** 2017. Direction of cage-free egg production. An invited presentation to the American Egg Board Food Technology Advisory Council meeting, May 10-11, 2017, Chicago, IL, USA
291. Lawrence, J.D., **H. Xin**, and M. Ibarburu. 2017. Economic impact of HPAI outbreak in Iowa. An invited presentation at the USDA-APHIS Field Reimbursement Specialists Training Workshop, March 23, 2017, National Animal Disease Center, Ames, IA, USA (Xin delivered the talk).
292. **Xin, H.** and Y. Zhao. 2017. Ventilation shutdown to control HPAI disease spread. An invited presentation at the USDA-APHIS Field Reimbursement Specialists Training Workshop, March 23, 2017, National Animal Disease Center, Ames, IA, USA.
293. **Xin, H.** 2017. A holistic evaluation of three egg production systems—*conventional cage, enriched colony and aviary cage-free*. A plenary presentation at the 10th International Congress of AVEM 2017, March 7-9, 2017, Queretaro, Mexico.
294. **Xin, H.**, K. Liu, H. Ma, and P. Settar. 2017. Behavioral and production responses of pullets and layers to LED vs. CFL light. A plenary presentation at the 10th International Congress of AVEM 2017, March 7-9, 2017, Queretaro, Mexico.
295. **Xin, H.**, Y. Zhao, E. Takle, D. Schmitt, and L. Chai. 2017. Measure, model and mitigate airborne transmission of avian influenza virus. A plenary presentation at the 10th International Congress of AVEM 2016, March 7-9, 2017, Queretaro, Mexico.
296. **Xin, H.** 2017. An overview of the egg industry evolution. An invited presentation at the USDA Agricultural Outlook Forum “A New Horizon”, Feb. 23-24, 2017, Washington D.C., USA
297. **Xin, H.** 2016. Poultry housing systems. A lecture presentation to the TSM 327 class, Nov. 28, 2016, Ames, IA, USA
298. **Xin, H.** 2016. Egg production systems: *pros and cons*. An invited presentation at the SusAg Graduate Program Colloquium, Nov. 16, 2016, Ames, IA, USA

299. **Xin, H.** 2016. Laying hen housing systems: *pros and cons*. An invited presentation at the Second International Workshop on Precision Environment Control, Nov. 7-11, 2016, UNICAMP, Brazil.
300. **Xin, H.** 2016. Measure, model and mitigate airborne transmission of avian influenza virus. An invited seminar at Wageningen University, Oct. 21, 2016, Wageningen, The Netherlands.
301. **Xin, H.** 2016. Poultry production systems: Part II – laying hens. A guest lecture presentation to the AnSci223 class, Oct. 5, 2016, Ames, IA, USA.
302. **Xin, H.** 2016. Poultry production systems: Part I – meat birds. A guest lecture presentation to the AnSci223 class, Oct. 3, 2016, Ames, IA, USA.
303. **Xin, H.** 2016. Developing trend of global layer industry. A plenary presentation at the 25th World Poultry Congress (WPC2016) – Symposium on Egg Production, Sept. 6-9, 2016, Beijing, China.
304. **Xin, H.** 2016. Environmental challenges and opportunities with cage-free hen housing system, an invited presentation at the 25th World Poultry Congress, Sept. 6-9, 2016, Beijing, China.
305. **Xin, H.** 2016. Trade-offs of different hen housing systems. A presentation at an Industry Forum on Egg Production Systems hosted by Beijing DQY Company, Sept. 24, 2016, Beijing, China.
306. Stinn, J.P. and **H. Xin.** 2016. Heat and moisture production rates of a modern U.S. swine breeding-gestation-farrowing facility. An invited presentation at the Plant, Animal and Facility Systems Distinguished Lecture Series held during the ASABE 2016 Annual International Meeting, July 17-20, 2016; Orlando, FL, USA.
307. **Xin, H.**, M. Ibarburu, and L. Vold. 2016. The US egg industry during and after 2015 HPAI outbreak. An invited presentation at the NE-1442 multi-state project meeting, August 8-11, 2016, University of Bern, Switzerland.
308. **Xin, H.** 2016. Automated measurements of farm animal behavioral and physiological responses. A presentation at the First International Symposium on Environment Control for Sustainable Animal Production, June 7-10, 2016, Federal University of Viçosa, Brazil.
309. **Xin, H.** and M. Ibarburu. 2016. The U.S. egg industry after 2015 HPAI outbreak. A presentation to the American Egg Board Food Technology Advisory Council, May 5, 2016, Chicago, IL, USA
310. **Xin, H.**, Y. Sato, and A. Wolc. State of the science on HPAI research. A presentation at the 2016 Egg Industry Center's Annual Egg Industry Issues Forum, April 20-21, 2016, Chicago, IL, USA
311. **Xin, H.** and Y. Zhao. 2016. HPAI studies and ventilation shutdown. A presentation to Joint State and Federal Field Veterinarian Staff, March 30, 2016, Des Moines, IA, USA.
312. **Xin, H.** 2016. Poultry housing systems. A guest lecture presentation to the AnSci223 class, March 23, 2016, Ames, IA, USA.
313. **Xin, H.** 2016. Hen housing systems and 2015 HPAI in the US. A plenary presentation at the Annual Meeting of the National Pasta Association, March 14-15, 2016, Naples, Florida, USA
314. **Xin, H.** 2016. Update on HPAI research. A presentation to the Industry Program Committee at the American Egg Board Meeting, March 10-11, 2016, Napa, California, USA
315. **Xin, H.** 2016. Environment and egg production. A keynote presentation at the 9th International Congress of AVEM2016, February 24-25, 2016, Queretaro, Mexico.
316. **Xin, H.** 2016. The 2015 HPAI outbreaks in the United States. A presentation to international delegations visiting Hy-Line International, Jan 22, 2016, West Des Moines, Iowa, USA
317. **Xin, H.** and M. Ibarburu. 2016. U.S. egg industry, statistics and prices. A presentation to international delegations visiting Hy-Line Int'l, Jan 22, 2016, West Des Moines, Iowa, USA
318. **Xin, H.**, Y. Zhao and E.S. Takle. 2015. Assessing potential airborne transmission of HPAI virus in Iowa. An invited presentation at the Iowa Turkey Federation 2015 Annual Convention held 9 December 2015, West Des Moines Marriott Hotel, Iowa, USA
319. **Xin, H.** 2015. U.S. poultry production systems. A guest lecture presentation to the TSM327 class, Nov. 4, 2015, Ames, IA, USA.

320. **Xin, H.** 2015. Environmental control technologies for livestock production. An invited presentation at the Workshop on Comprehensive Nutrient Management Plan held Oct. 26-27, 2015, Zhangye City, Gansu Province, China.
321. **Xin, H.** and Y. Zhao. 2015. Modeling of ventilation shutdown of layer houses. An invited presentation at the Iowa Egg Industry Symposium, 1 October, 2015, Ames, Iowa, USA
322. **Xin, H.** and Y. Zhao. 2015. Modeling of ventilation shutdown of layer houses. A keynote presentation at the International Egg Commission 2015 Global Leadership Conference, Sept 20-24, 2015, Berlin, Germany.
323. **Xin, H.** 2015. U.S. poultry production systems. A guest lecture presentation to the SusAg515 class, Sept. 1, 2015, Ames, IA, USA.
324. **Xin, H.** 2015. Comprehensive Nutrient Management Plan (CNMP) – *Air Quality*. A presentation at the CNMP Training Workshop held at the Chinese Academy of Agricultural Sciences, March 24-25, 2015; Beijing, China.
325. **Xin, H.** 2015. State of the U.S. egg industry. A graduate seminar presentation at the Chinese Academy of Agricultural Sciences, March 25, 2015, Beijing, China.
326. **Xin, H.** 2015. Managing air in poultry housing. An invited presentation at the Annual Atlantic Poultry Conference, February 11-13, 2015, Greenwich, Nova Scotia, Canada.
327. **Xin, H.** 2015. Advancement of the U.S. egg industry over the past 50 years. An invited presentation at the US Poultry Animal Agriculture Sustainability Summit, January 27, 2015; Atlanta, GA, USA.
328. **Xin, H.** 2015. State of the U.S. egg industry. An invited presentation at the Ames Morning Rotary Club, January 21, 2015; Ames, Iowa, USA.
329. **Xin, H.** 2014. Environmental impact of three laying-hen housing systems. An invited presentation at the 2014 Fall ABE Extension In-service Training, September 24, 2014; Iowa State University, Ames, Iowa, USA.
330. **Xin, H.** 2014. Research on animal environment and behavior. An invited presentation at the Workshop on Animal Environment and Welfare held Sept 13-14, 20014, Harbin, China.
331. **Xin, H.** 2014. Monitoring air emissions of animal production systems. A keynote presentation at an International Symposium on Animal Manure Management and Environmental Control sponsored by the Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Science, June 27-28, 2014, Beijing, China.
332. **Xin, H.** 2014. Environmental control for egg production. A keynote presentation at the Hy-Line International Bi-annual Technical School, June 9-13, 2014; Sheraton Hotel, West Des Moines, Iowa, USA (~120 international attendees).
333. **Xin, H.** 2014. Egg production and energy use. 2014. A webinar presentation to the USDA-NRCS On-Farm Energy Quality Assurance Program, April 23, 2014.
334. **Xin, H.,** N. Pelletier, M. Ibarburu. 2014. U.S. egg industry environmental footprint in 1960 and 2010. Presentation to the “Think Tank on Animal Agriculture” Meeting, April 21, 2014; Ames, Iowa, USA.
335. **Xin, H.,** N. Pelletier, M. Ibarburu. 2014. U.S. egg industry environmental footprint in 1960 and 2010. Presentation at the 49th Egg Farmer of Ontario Annual Conference, March 25, 2014; Toronto, Canada.
336. **Xin, H.,** N. Pelletier, M. Ibarburu. 2014. Comparison of the U.S. egg industry environmental footprint in 1960 and 2010. Keynote speech at the Symposium on Poultry Industry Sustainability organized by the Science and Information Centre for Sustainable Poultry Industry [Wissenschafts-und Informationszentrum Nachhaltige Geflügelwirtschaft (WING)], February 27, 2014; Vechta, Germany.

337. **Xin, H.**, M. Ibarburu, and N. Pelletier. 2014. What can we learn from the observed improvement in the U.S. egg industry's environmental footprint? A keynote speech at the IPPE Symposium "Egg and the World Food Challenges", Jan 29, 2014; Atlanta, GA, USA.
338. **Xin, H.** 2013. Swine environmental control and mortality disposal options. An invited presentation for the China Ministry of Agriculture Training Workshop on Swine Production, December 19-21, 2013; Beijing, China.
339. **Xin, H.** 2013. An overview of U.S. poultry housing systems. A lecture to TSM327 class, November 18, 2013; Iowa State University, Ames, IA, USA.
340. **Xin, H.** 2013. Environmental control for poultry production. An invited seminar presentation in the College of Animal Science at Agricultural University of Hebei, October 23, 2013; Baoding, Hebei, China.
341. **Xin, H.**, M.D. Hayes, Y. Zhao, M. Ibarburu, S. Millman. 2013. On aviary hen housing. An invited plenary presentation at the International Symposium on Animal Environment and Welfare, Oct 20-22, 2013; Rongchang, Chongqing, China.
342. **Xin, H.** 2013. Environmental footprint of the U.S. egg industry. A plenary presentation at the United Egg Producers Annual Meeting, Oct 9-11, 2013, Ashville, NC, USA.
343. **Xin, H.** 2013. U.S. egg industry and the Egg Industry Center. A guest lecture to AnSci 501 (Graduate Seminar), Sept 30, 2013; Iowa State University, Ames, IA, USA.
344. **Xin, H.** 2013. Environmental control for poultry production. An invited plenary presentation at the 16th China National Poultry Science Symposium, May 13-15, 2013; Yangzhou, China.
345. **Xin, H.** 2013. Systems and protocols for monitoring AFO air emissions. An invited presentation at the Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences, May 21, 2013; Beijing, China.
346. **Xin, H.** and J. P. Stinn. 2013. Gaseous emissions, heat and moisture production, and heat mat vs. heat lamp comparison in a modern breeding, gestation and farrowing swine facility. An invited presentation at the Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences, May 21, 2013; Beijing, China.
347. **Xin, H.**, N. Pelletier, M. Ibarburu. 2013. Dramatic advancement of the U.S. egg industry over the past 50 years. An invited presentation at the 2013 Egg Industry Center Annual Egg Industry Issues Forum, April 16-17, 2013, St. Louis, MO, USA.
348. **Xin, H.** 2013. Animal heat exchange pathways and cooling options. An invited presentation at the Heat Stress Symposium held at Iowa State University, April 4-5, 2013, Ames, Iowa, USA
349. **Xin, H.** 2013. Environmental impact of three hen housing systems. An invited presentation at the Midwest Poultry Federation Convention Educational Session – Simmering Issues, March 14, 2013, St Paul, MN, USA.
350. **Xin, H.** 2013. Advancement of U.S. egg industry over the past 50 years. An invited presentation at the Chinese Academy of Agricultural Science – Institute of Animal Science, Jan 22, 2013, Beijing, China.
351. **Xin, H.** 2013. Environmental footprint of the egg – Dramatic progress over the past 50 years. An invited presentation at the Future of U.S. Egg Industry Symposium held during the International Poultry Expo, Jan 31, 2013, Atlanta, GA, USA.
352. **Xin, H.** 2012. State and R&D opportunities of U.S. egg industry and the role of Egg Industry Center. A keynote presentation at the Joint Conference of Chinese Association of Animal Science and Veterinary Medicine and Chinese Society of Agricultural Engineers on Eco-environment and Sustainable Livestock Production, Nov 2-5, 2012, Beijing, China.
353. **Xin, H.** 2012. Fundamentals of thermal environment and animal responses. A lecture to the graduate-level class "Environmental Physiology", Nov 6, 2012, China Agricultural University, Beijing, China.

354. **Xin, H.** 2012. Animal indirect calorimeter – theory and applications. A lecture to the graduate-level class “Environmental Physiology”, Nov 6, 2012, CAU, Beijing, China.
355. **Xin, H.** 2012. Animal housing ventilation systems and management. A lecture to the graduate-level class “Environmental Physiology”, Nov 7, 2012, CAU, Beijing, China.
356. **Xin, H.** 2012. An overview of U.S. poultry production systems. A presentation to the National Graduate Training Workshop, Nov 7, 2012, China Agricultural University, Beijing, China.
357. **Xin, H.** 2012. An overview of U.S. poultry production systems. A presentation to the National Graduate Training Workshop, Nov 7, 2012, China Agricultural University, Beijing, China.
358. **Xin, H.** 2012. A Comprehensive assessment of aviary laying-hen housing system in the Midwest. A presentation at the Iowa Poultry Association Fall Festival Educational Session, Sept 20, 2012, Okoboji, Iowa, USA.
359. **Xin, H., N. Pelletier, and M. Ibarburu.** 2012. Environmental footprint of the egg – dramatic progress over the past 50 years. A keynote presentation at the International Egg Commission 2012 London Conference, Sept 10-13, 2012, London, United Kingdom.
360. **Xin, H.** 2012. Trend and R&D opportunities of laying-hen housing systems. An invited keynote presentation at the XXIV World Poultry Congress, August 5-10, 2012, Salvador, Brazil.
361. **Xin, H.** 2012. An exciting time for China – US collaborations in sustainable agriculture. An invited keynote presentation at the China Exchange Session of the ASABE Annual International Meeting, July 29 – Aug 1, 2012, Dallas, Texas, USA
362. **Xin, H.** 2012. Toward standardization of data collection, analysis and presentation of AFO air emissions. An invited keynote presentation at the Ninth International Livestock Environment Symposium, July 9-12, 2012, Valencia, Spain.
363. **Xin, H.** 2012. Environmental management of laying-hen houses to improve egg Production. An invited presentation at the Hy-Line International Technical School, July 16-19, 2012, West Des Moines, Iowa, USA.
364. **Xin, H.** 2012. U.S. Egg Industry and the Egg Industry Center. A presentation to graduate students and faculty at the Agricultural University of Hebei, June 15, 2012, Baoding, China.
365. **Xin, H. and M. Ibarburu.** 2012. Toward sustainable development of egg industry and the role of Egg Industry Center. An invited presentation at the International Symposium on Egg Industry, June 18-19, 2012, Beijing, China.
366. **Xin, H.** 2012. A holistic view of egg production systems and implications for the US pasta industry. An invited presentation at the National Pasta Association Annual Meeting, March 26-27, 2012, Naples, FL, USA
367. **Xin, H.** 2011. A balanced approach to animal welfare issues to avoid unintended consequences. A keynote speech at the International Symposium on Health Environment and Animal Welfare, Oct 20-22, 2011; Rongchang/Chongqing, Sichuan Province, China.
368. **Xin, H.** 2011. Measurement and mitigation of air emissions from animal production facilities. An invited presentation for the Ensminger Outreach Program held on Oct 16, 2011 at the Institute of Animal Science, the Chinese Academy of Agricultural Sciences, Beijing, China.
369. **Xin, H.** 2011. Measurement and mitigation of air emissions from animal production facilities. An invited presentation for the Ensminger Outreach Program held on Oct 18, 2011 at Huanzhong Agricultural University, Wuhan, Hubei Province, China
370. **Xin, H.** 2011. U.S. egg industry and the Egg Industry Center. An invited presentation at the Anhui Academy of Agricultural Sciences, Oct 26, 2011, Hefei, Anhui Province, China
371. **Xin, H.** 2011. An overview of precision livestock farming. An invited presentation at the Chinese Academy of Agricultural Sciences – Feed Research Institute, Aug 2-3, 2011, Beijing China.

372. **Xin, H.** and R.T. Burns. 2011. Swine deep-pit barn fires: Understanding the causes. A presentation to the Agribusiness Association of Iowa Feed and Livestock Committee, July 20, 2011, Des Moines, Iowa, USA
373. **Xin, H.** 2011. Managing temperature and ventilation in fully automated hen houses to optimize egg production, Hy-Line International Technical Service Workshops, June 12-17, 2011, Columbia (Bogota, Cali and Bucaramanga, a total of about 450 people in attendance),
374. **Xin, H.** 2011. Ammonia emissions from poultry operations. Ammonia Emissions and Nitrogen Conservation Workshop organized by the Ohio State University Extension, May 1-2, 2011, Nationwide and Ohio Farm Bureau 4-H Center, Columbus, OH, USA
375. **Xin, H.** 2011. Overview of ammonia mitigation BMPs and BATs. Ammonia Emissions and Nitrogen Conservation Workshop organized by the Ohio State University Extension, May 1-2, 2011, Nationwide and Ohio Farm Bureau 4-H Center, Columbus, OH, USA
376. Pelletier, N., Ibarburu, M. and **H. Xin.** 2011. A life cycle assessment of supply chain greenhouse gas emissions for egg production and processing in Iowa. A presentation at the Third Annual Egg Industry Issues Forum, April 7, 2011, Columbus, OH, USA
377. **Xin, H.** 2011. U.S. egg industry and the Egg Industry Center. A Seminar for the ISU Veterinary Medicine Theriogenology Club, April 4, 2011, Ames, Iowa, USA
378. **Xin, H.** 2011. U.S. egg industry and the Egg Industry Center. A Seminar for the ISU AnSci Meat Science Class, March 2, 2011, Ames, Iowa, USA
379. **Xin, H.** 2011. Update of the Egg Industry Center and related program. Nebraska Poultry Industry Convention, Feb 23-25, 2011, Columbus, NE, USA
380. **Xin, H.** 2011. U.S. egg industry and the Egg Industry Center. A Seminar for the ISU Food Science Department, February 2, 2011, Ames, Iowa, USA
381. **Xin, H.** 2011. A holistic approach to assessing laying-hen production systems. ISU and University of Nebraska joint training in animal welfare, Jan 5-6, 2011, Ames, Iowa, USA
382. **Xin, H.** 2010. The past, present and future of U.S. egg industry. Presented at the Second Sino-US Workshop on Egg Production and Environmental Control, Oct 10-12, 2010, Shanghai, China
383. **Xin, H.** 2010. How to produce high-quality SCI journal articles. Presented at the Feed Research Institute of the Chinese Academy of Agricultural Sciences, Oct 14, 2010, Beijing, China
384. **Xin, H.** 2009. Cooling poultry in hot climates. Presented at the International Workshop on “*Animal Housing in Hot Climates*” organized by the CIGR Section II Working Group, Oct 22-25, 2009, Rongchang, Sichuan, China
385. **Xin, H.** 2009. Overview of air emission mitigation options for animal feeding operations. A special presentation to the USDA Agricultural Air Quality Task Force, September 17, 2009, Des Moines, Iowa, USA
386. **Xin, H.** 2009. U.S. egg production, environmental control and housing systems for egg production. Plenary presentation at the Sino-US Workshop on Egg Production, July 17, 2009, China Agricultural University, Beijing, China
387. **Xin, H.** 2009. Mitigating ammonia emissions from laying-hen houses through dietary manipulation. Plenary presentation at the Egg Industry Issues Forum sponsored by the Egg Industry Center, April 8, 2009, Des Moines, Iowa, USA
388. **Xin, H.** 2009. Egg Industry Center and Egg Processing Research at Iowa State University. Plenary presentation at the International Egg Commission Annual Conference, March 29-April 1, 2009, London, United Kingdom
389. **Xin, H.** 2009. Cooling poultry in tropical climates. Ensminger International Conference, February 7-14, 2009, San Jose, Costa Rica
390. **Xin, H.** 2008. Overview of air emission remediation technologies. National Poultry Waste Management Symposium, October 21-23, 2008, Des Moines, IA, USA

391. **Xin, H.** 2008. Turkey air emissions. A presentation at the Iowa Turkey Federation Annual Turkey-Day Conference, December 2-4, 2008, Des Moines, IA, USA
392. **Xin, H.** 2008. Quantification and mitigation of air emissions from broiler, turkey and laying hen facilities. Midwest Poultry Federation Convention, March 19-20, 2008, St. Paul, MN, USA
393. **Xin, H.** 2008. Monitoring of air emissions from Midwest turkey barns. National Turkey Federation Annual Convention, February 10-12, 2008, San Diego, CA, USA
394. **Xin, H.** 2007. Improving air quality by managing ammonia and humidity. Pennsylvania Poultry Sales and Service Conference, September 18-20, 2007, Lancaster, PA, USA
395. **Xin, H.** 2007. Ammonia emissions from pullet and layer facilities: Present and future. Poultry Sales and Service Conference, September 18-20, 2007, Lancaster, PA, USA
396. **Xin, H.** 2007. Update on turkey barn air emissions monitoring. Turkey Research Review/APV Symposium, September 27, 2007, Holiday Inn & Convention Center, Willmar, MN, USA
397. **Xin, H.** 2007. State of air emissions for U.S. egg production operations. Invited plenary talk at the International Egg Commission Annual Conference, March 25-27, 2007, London, UK
398. **Xin, H.** 2007. Research update on measurement and mitigation of air emissions from egg operations. Invited talk at the Midwest Poultry Federation Convention, March 13-15, 2007, St Paul, MN, USA
399. **Xin, H., H. Li, and R.T. Burns.** 2006. Strategies to reduce air emissions in layer facilities. Invited talk at the National Poultry Waste Management Symposium, Oct. 24-25, 2006, Springdale, AR, USA
400. **Xin, H.** 2006. UEP initiative toward mitigating air emissions. Invited talk at the National Poultry Waste Management Symposium, Oct. 24-25, 2006, Springdale, AR, USA
401. **Xin, H.** 2006. Testing for poultry air emissions. Invited talk by U.S. Poultry & Egg Association at the International Poultry Expo Educational Workshop, January 2006, Atlanta, GA, USA
402. Cook, R.N. and **H. Xin.** 2004. Effects of cage stocking density on feeding behaviors of group-housed laying hens. Proc of the Iowa Egg Industry Symposium, pp41-47. Iowa State University, Ames, Iowa, USA
403. **Xin, H.** 2004. Air emissions from egg operations – current state and future needs. Presentation at the United Egg Producers Annual Convention, Oct 20-22, 2004, New Orleans, LA, USA
404. **Xin, H.** 2004. Ammonia emission from laying hen house in Iowa. Presentation to a joint meeting of the United Egg Producers and United Egg Board Executive Committees, Jan 26-27, 2004, Atlanta, GA, USA
405. **Xin, H.** 2002. Quantification of ammonia emissions from U.S. poultry houses. Invited presentation at a special seminar on “Air Pollutants and Noise in Animal Production”, September 10-11, 2002, UNICAMP, Brazil
406. **Xin, H.** 2001. Sino-US collaboration to develop aerosols emission inventory and reduction techniques for concentrated animal feeding operations. In: Proceedings of the Agro-environment and Compost Demonstration – Seminar on Sino-US Collaboration in Agriculture, sponsored by the Department of International Cooperation, MOA, PRC and Foreign Agriculture Service, USDA, Nov. 5-7, 2001, Beijing, China, pp29-32.
407. **Xin, H., J.D. Harmon, D.H. Harris, R.C. Ewan, and M.L. Gramer.** 1999. Effects of post-weaning nutritional regimens on PIC Isowean pigs. In: Proceedings of the American Association of Swine Practitioners Annual International Conference, Feb 27 – March 3, 1999, Adam’s Mark Hotel, St. Louis, MO, USA
408. **Xin, H.** 1998. Ventilation to control poultry house indoor air quality. An International Symposium on Environment and Air Quality of Poultry Production sponsored by the Brazilian Agricultural Research Corporation – EMBRAPA and Brazilian National Center for Research on Swine and Poultry – CNPSA, Oct. 27-30, 1998, Concordia, Brazil

409. **Xin, H.** 1998. Assessing swine thermal stress via neural network analysis of their behavioral images coupled with thermography. An International Symposium on Recent Advances in Assessing Heat Stress of Domestic Animals sponsored by the American Society of Animal Science (ASAS), July 27-29, 1998, Denver, CO, USA
410. **Xin, H.**, J. Shao, and J. Hu. 1998. Image analysis of swine postural behavior. Measuring Behavior '98 - An International Conference on Measurement of Animal Behavior, held on August 19-22, 1998, Groningen, The Netherlands
411. **Xin, H.** 1997. Too hot or too cold? Ask the pigs. *ASAE Resource magazine* (1): 7-8. (Feature article invited by the ASAE).
412. **Xin, H.** 1997. Lecture series on livestock environment control: principles, state-of-the-art technologies, and case studies. The Chinese Academy of Agricultural Sciences, September 6 - 13, 1997, Beijing, China
413. **Xin, H.** and J. Shao. 1997. Application of machine vision to swine environmental control. IEEE/ASME International Conference on Advanced Intelligent Mechatronics, June 16-20, 1997, Waseda University, Japan
414. **Xin, H.** 1996. Automated data acquisition system for field animal environmental research. The 1st International Conference on Agricultural and Biological Environmental Engineering, Aug. 15-19, 1996, Beijing, China
415. **Xin, H.** 1996. Responses of neonatal chicks to post-hatch holding environment. The 1st International Conference on Agricultural and Biological Environmental Engineering, Aug. 15-19, 1996, Beijing, China
416. **Xin, H.** 1996. Principles of Poultry House Ventilation. 1996 Iowa Poultry Symposium, March 28, 1996, Scheman Continuing Education Center, Iowa State University, Ames, Iowa, USA
417. **Xin, H.** 1995. A computerized measurement and data acquisition system for field poultry research. The 4th Latin America Conference on Agromatics, April 24-28, 1995, the Institute of Technology of Costa Rica, San Carlos, Costa Rica
418. **Xin, H.** 1995. Air transport of day-old chicks. Livestock Export Workshop sponsored by USDA Agricultural Marketing Service, October 24-25, 1995, Ithaca, New York, USA

National & International Professional Conference Papers/Presentations: 250+

Extension Publications and Popular Press Articles Derived from Research

1. Xin, H. 2016. Opportunities and challenges of going cage-free. An invited "Viewpoint" article to Poultry Times, July 6, 2016. http://www.poultrytimes.com/poultry_today/article_1fb7e224-43a6-11e6-b8d7-c7420f870aec.html
2. Stinn, J. P., T. A. Shepherd, and **H. Xin.** 2014. Optimizing tunnel ventilation systems for summer conditions. A.S. Leaflet-R2895. Animal Industry Report, Iowa State University Extension, Ames, IA.
3. Zhao, Y. and **H. Xin.** 2013. Ammonia concentrations and emissions of aviary hen houses. A.S. Leaflet-R2802. Animal Industry Report, Iowa State University Extension, Ames, IA.
4. Zhao, Y. and **H. Xin.** 2013. Roof insulation in laying-hen houses to ease summer heat stress. A.S. Leaflet-R2803. Animal Industry Report, Iowa State University Extension, Ames, IA.
5. Harmon, J.D., D. Petersen, and **H. Xin.** 2012. Conserving energy by using localized heating in swine housing - Farm Energy. ISU Extension Publication PM 2089V, Ames, Iowa.
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Other General Audience Publications

More than 70 project reports submitted to funding agencies.

Technology Transfer

Industrial Licensing:

- Method to alleviate long-journey transport stress and mortality of chicks (ISURF # 02089)
- Innovative chick shipping container (ISURF # 02019)

Intellectual Property Disclosure:

- Behavior-Based Interactive Environmental Controller for Swine (ISURF #02716)

CONTRACTS AND GRANTS (1994-present)

Principal investigator (PI) or Co-PI of **\$23,611,150** contracts and grants in competitive research, extension and education programs. Listed below are collaborating colleagues at ISU and other institutions.

Name	Position	Department/Affiliation
Ahn Dong U.	Professor	AnSci
Beck, Mary M.	Professor and Dept. Head	Mississippi State Univ.
Benson, Eric	Professor	University of Delaware
Bregendahl, Kristjan	Assistant Professor	AnSci (now ADM)
Brown-Brandl, Tami	Agricultural Engineer	USDA-ARS-MARC
Burns, Robert T.	Associate Dean and Professor	ABE (now at U of TN)
Dixon, Philip M.	University Professor	Statistics
Dong, Hongmin	Professor and Director General	CAAS, Beijing, China
Gates, Richard S.	Professor	University of Illinois
Halbur, Patrick G.	Professor and Dept Chair	Vet Med
Harmon, Jay D.	Professor	ABE
Harris, Dilbert (Hank) L.	Professor (retired)	AnSci
Heber, Albert J.	Professor	Purdue University
Hoff, Steven J.	Professor	ABE
Ibarburu, Maro	Associate Scientist	Egg Industry Center
Jacobson, Larry	Professor	University of Minnesota
Kanwar, Ramesh	Distinguished Professor	ABE
Kerr, Brian	Research Leader	USDA-ARS
Kliebenstein, Jim	Professor (retired)	Economics
Koziel, Jacek	Associate Professor	ABE
Koelkebeck, Ken	Professor	University of Illinois
Li, Hong	Assistant Professor	University of Delaware
Mench, Joy	Professor (retired)	UC-Davis
Lorimor, Jeffery C.	Associate Professor (retired)	ABE
Mickelson, Steve	Professor & Chair	ABE
Millman, Suzanne	Associate Professor	Vet. Diag. & Prod. Ani. Med.
Noll, Sally	Professor	University of Minnesota
Patience, John	Professor	AnSci
Persia, Michael E.	Assistant Professor	AnSci (now VPI)
Powers, Wendy	Professor	AnSci (now UC-Davis)
Patterson, Paul	Professor	The Penn State University
Richard, Tom	Professor	ABE (now PSU)
Reynnells, Richard D.	National Program Leader (retired)	USDA, Washington D.C.
Robin, Paul	Senior Researcher	INRA UMR SAS, France
Sato, Yuko	Assistant Professor	Vet. Diag. & Prod. Ani. Med.
Sell, Jerry L.	Distinguished Professor (retired)	AnSci
Stewart, Brian	Professor	ABE
Swanson, Janice	Department Chair and Professor	Michigan State University
Tao, Yang	Professor	University of Maryland
Tang, Lie	Associate Professor	ABE
Trampel, Darrell W.	Professor (deceased)	Vet. Diag. & Prod Ani. Med.
Venkitanarayanan, Kumar	Professor	University of Connecticut
Wang, Tong	Professor	Food Sci. & Human Nutrition

Collaborating colleagues at ISU and other institutions (cont'd).

Name	Position	Department/Affiliation
Wesley, Irene	Research Scientist (retired)	Nat'l Animal Disease Center
Wheeler, Eileen F.	Professor	The Penn State University
Yoon, K.J.	Professor	Vet. Diag. & Prod. Ani. Med.
Zhang, Qiang	Professor	University of Manitoba, Canada
Zhang, Ruihong	Professor	UC-Davis
Zhao, Lingying	Professor	The Ohio State University

Abbreviation of Funding Agencies:

6-SCAWM:	6-State Consortium on Animal Waste Management
AEB:	American Egg Board
AFRDI:	Agri-Food Research and Development Initiative and Manitoba Hydro
ASHRAE:	American Society of Heating, Refrigerating, and Air Conditioning Engineers
BFE:	Bureau of Foreign Experts, China
CAAS:	Chinese Academy of Agricultural Sciences
CATD:	Center for Advanced Technology Development
CFI:	Center for Food Integrity
CIRAS	Center for Industry Research Assistance Service
EFC:	Egg Farmers of Canada
FIPSE-DOE:	Funds for Improvement of Post-Secondary Education, US Department of Education
HLI:	Heartland Lysine, Inc., Chicago, IL
Hy-Line	Hy-Line International
ICF:	Iowa Cage Free, Johnston, Iowa
ICPB:	Iowa Corn Promotion Board
IEC:	Iowa Egg Council
ILHAC:	Iowa Livestock Health Advisory Council
IPPA:	Iowa Pork Producers Association
IPRT:	Institute for Physical Research and Technology
ISPB:	Iowa Soybean Promotion Board
ISU-COE:	ISU College of Engineering Seed Grant
ISU-DAIRG:	ISU Dean of Agriculture's International Research Grants
ISU-SPRIG:	ISU Special Research Initiation Grant
ITF/ ITMC:	Iowa Turkey Federation/Iowa Turkey Marketing Council
MAAS:	Manitoba Association of Agricultural Societies
MPC:	Midwest Poultry Consortium
MPRP:	Midwest Poultry Research Program
MOA:	Ministry of Agriculture, China
NE-127:	Multi-state Research Project "Biophysical Models for Poultry Production Systems"
NII:	Novus International, Inc.
NPB:	National Pork Board
NPPC:	National Pork Producers Council
PIC:	Pig Improvement Company
RSCHE:	Russian State Commission of Higher Education
UEA:	United Egg Allied
UEP:	United Egg Producers
USDA-ARS-MARC:	U.S. Department of Agriculture Research Service Meat Animal Research Center
USDA-FAS:	U.S. Department of Agriculture Foreign Agricultural Service
US EPA:	U.S. Environmental Protection Agency
USPEA:	U.S. Poultry and Egg Association
USDA-NIFA:	USDA National Institute of Food and Agriculture
USDA-NRI:	USDA National Research Initiative Competitive Program

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
AEB and EIC partnership to provide monthly industry reports, economic analysis and information synthesis for the U.S. egg industry	AEB	Xin	Ibarburu	01/01/18 – 12/31/18	\$107,600
Evaluating behavioral responses of poultry to ultraviolet light via preference test	Once Innovations	Xin	Liu, Sato	02/01/17 – 08/31/17	\$74,400
Enhancing the health and well-being of preweaning piglets	USDA-NIFA	Xin	Brown-Brandl, Stinn, Vallet, Butters-Johnson, Y. Zhao	02/16/16 – 02/15/18	\$500,000
Comprehensive evaluation of a programmable LED light vs. traditional CFL light for egg production (Phase II)	Hy-Line and CIRAS	Xin	Wang, Liu	03/01/16 – 12/31/16	\$80,000
Airborne transmission of highly pathogenic avian influenza virus in the poultry industry and the role of dust as a carrier	USDA-NIFA	Xin	Y. Zhao, Yoon	09/01/15 – 08/31/17	\$100,000
Research on avian influenza outbreaks	EFC	Xin		06/01/15 – 05/31/18	\$384,615 (\$500,000 Canadian \$)
Understand, mitigate and prevent HPAI outbreaks	AEB	Xin	Y. Zhao, Takle	09/01/15 – 08/31/17	\$120,000
Egg Industry Center economic analysis and statistical reports	AEB	Xin	Ibarburu	01/01/13 – 12/31/16	\$312,741
Comprehensive evaluation of a programmable LED light vs. traditional CFL light for egg production (Phase I)	Hy-Line and CIRAS	Xin	Liu, Wang	03/01/15 – 12/31/15	\$65,000
Electrostatic precipitation for air cleaning of particulate matter (PM) emissions at animal production facilities	USDA-NIFA	L. Zhao	Zhu, Xin , Lee	01/01/16 – 12/31/18	\$499,953
An innovative system to improve environment and productivity of aviary hen housing	USDA-NIFA	Xin	Y. Zhao, Wang, Millman, Soupir	12/15/14 – 12/14/17	\$496,176
Comparison of environmental footprint of U.S. eggs vs. other plant and animal sources	AEB	Xin	Ibarburu, Pelletier, Wang	02/25/14 – 02/24/15	\$75,048
Evaluation of LED lighting in aviary hen housing	IPRT and ICF	Xin	Wang, Y. Zhao	07/01/13 – 06/30/14	\$50,449
Evaluation of transportation conditions on performance of weaned and feeder pigs	NPB	Harmon	Xin , Hoff, Baas	07/01/13 – 06/30/14	\$47,196
Quantification of greenhouse gas emissions from a Midwestern swine breeding/farrowing /gestation facility	IPPA	Xin	Burns, Patience	08/01/12 – 03/01/14	\$86,999
An examination of argon gas for on-farm anesthesia and euthanasia of livestock	USDA-NIFA	Millman	Xin et al.	10/01/12 – 09/30/15	\$483,464
Comparing heat lamp vs. heat mat for farrowing crate heating	IPPA	Xin	Stinn	08/01/12 – 12/31/13	\$16,914

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
A comparative assessment of environmental footprint of the U.S. egg production supply chains between 1960 and 2010	AEB, USPEA, UEA	Xin	Ibarburu, Pelletier, Westergard	08/06/12 – 08/05/13	\$120,000
Assessment of alternative production systems for laying hens to safeguard animal welfare and sustainable egg supply	USDA-NIFA	Xin	Li, Tang, Millman, Ibarburu-Blanc, Brehm-Stecher, et al.	04/15/11 – 04/14/14	\$700,000
Sustainable egg production: animal welfare, human health, environmental and economic aspects	CFI (through UC-Davis)	Swanson, Mench, Xin , Jones	~ 20 scientists at MSU, UCD and USDA-ARS	10/01/10 – 09/30/14	\$6,000,000 Xin's share: \$1,023,388
Quantitative electroencephalography as an indicator of broiler and layer chicken welfare status during exposure to various stressful conditions	USDA-NIFA	Benson (U of DE)	Xin , Alphin (UD), Johnson (UPenn), Persia	10/01/10 – 09/30/12	\$238,500
Sustaining Iowa pork production and air quality	IPPA	Xin	Colletti	09/01/10 – 08/31/13	\$57,000
Development of monitoring methods for quantifying greenhouse gas emissions reduction through use of biogas digesters for livestock manures in China	US EPA	Dong	Zhu, Xin	10/01/10 – 09/30/13	\$372,750
Reducing egg-borne outbreaks of Salmonella Enteritidis by integrating research and extension	USDA-NIFA	Venkitanarayanan	Darre, Xin , Curtiss, Patterson	09/01/10 – 08/31/14	\$598,551 Xin's share: \$51,881
Donation of National Air Emissions Monitoring Study (NAEMS) equipment to Egg Industry Center (Gift in Kind)	AEB	Xin		07/01/10	\$ 596,945
Quantification of greenhouse gas emissions from a Midwestern swine breeding/farrowing /gestation facility	IPPA	Xin	Burns, Patience	08/01/10 – 07/31/12	\$135,474
Midwest Poultry Research Program	USDA-NIFA Special Grant	Xin	Li, Ibarburu, Persia, Millman, Brehm-Stecher	08/01/10 – 07/31/11	\$438,345
A comprehensive assessment of aviary laying-hen housing system for egg production in the Midwest (supp. funding)	IEC	Xin	Li, Ibarburu, Millman	04/01/10 – 08/31/11	\$30,000
Sponsorship of Egg Industry Issues Forum	AEB	Xin		03/01/10 – 09/01/10	\$30,000
Cash match funding for the USDA NRCS CIG Project – Part 2	UEP	Xin	Li	01/01/10 – 08/31/10	\$50,000
Characterizing the carbon footprint of U.S. egg production using life cycle assessment	AEB	Xin	Ibarburu, Pelletier	01/01/10 – 12/31/10	\$46,485
Effects of long-term supplementation of layer diets with high concentrations of cholecalciferol on egg yolk Vitamin D concentration, egg quality, hen performance and hen health	AEB & IEC	Persia	Wang, Xin , Lamont, Beitz	01/01/10 – 12/31/11	\$119,103

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
Ammonia emissions of pullets and laying hens as affected by stocking density – Yr 2	IEC	Xin	Li, Mendes	07/01/09 – 06/30/10	\$46,132
Evaluation of different diets on ammonia emission and production performance of laying hens	IEC	Xin	Chepete, Li	07/01/09 – 06/30/10	\$43,670
Impacts of feeding DDGS to swine: aerial emissions and potential management strategies	IPPA	Burns	Xin	07/01/09 – 10/31/10	\$107,347
Midwest Poultry Research Program	USDA-CSREES Special Grant	Xin	Wang, Reitmeier	08/01/09 – 07/31/10	\$439,107
Midwest Poultry Research Program	USDA-CSREES Special Grant	Xin	Ahn	09/01/08 – 08/31/09	\$389,947
Updating heat and moisture production rates of modern swine and their housing systems	ASHRAE	Brown-Brandl	Xin	04/01/09 – 05/30/12	\$180,000 Xin's share: \$64,441
Ammonia emissions of pullets and laying hens as affected by stocking density	IEC	Xin	Li, Mendes	07/01/08 – 06/30/09	\$43,419
Assessing hen response to ammonia and thermal comfort combinations via preference test	IEC	Xin	Li, Hayes	07/01/08 – 06/30/09	\$49,033
Hydrogen sulfide spatial distribution and worker exposure in swine houses	IPPA	Burns	Keren, Xin , Hoff	05/01/08 – 04/30/09	\$49,715
An automated feed intake and body weight monitoring system for individual turkeys raised in flocks	Hybrid Turkeys (ON, Canada)	Tang	Xin	01/01/08 – 06/30/09	\$189,761
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	USDA-NRCS-CIG (Flow-through UEP)	Xin	Gregory, Burns, Gates Bregendahl, Kliebenstein, Wheeler, Patterson	10/01/07 – 03/31/10	\$812,998 Xin's share: \$432,030
Cash match funding for the USDA NRCS CIG Project	UEP	Xin	Burns, Bregendahl, Kliebenstein	10/01/07 – 03/31/10	\$100,000
Evaluating the effect of dietary corn DDGS on microbial populations in the intestine of the laying hen	IEC	Xin	Roberts, Bregendahl, Trampel	07/01/07 – 06/30/08	\$43,558
Determining ammonia and particulate matter emissions from Midwest turkey grow-out buildings	USDA-NRI	Xin	Burns, Jacobson, Harmon, Hoff, Noll	03/01/07 – 02/28/09	\$499,933

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
Determining ammonia and particulate matter emissions from Midwest turkey houses	Iowa Turkey Federation	Xin	Burns, Harmon, Hoff, Li	07/01/07 – 02/28/08	\$15,000
Development and testing of a hydrogen sulfide detection system for use in swine housing	NPB	Burns	Xin , Hoff, Moody, Muhlbauer	03/01/07 – 02/28/08	\$48,389
Field verification of ammonia emission mitigation strategies for layer houses	USPEA	Xin	Burns, Wheeler, Patterson, Gates	03/01/07 – 02/28/08	\$70,436
Reference procedures to measure polluting emissions from livestock buildings and storage to air	ADEME (French Environment and Energy Agency)	Robin	Xin et al. (14 international institutions)	01/01/07 – 02/28/09	€1,040,741 (\$1,352,963) Xin's share: €34,222
Development of a producer-oriented portable tool for measurement of ammonia emission from high-rise house or manure storage	IEC	Xin		07/01/06 – 06/30/07	\$15,167
Effect of dietary corn DDGS on ammonia emission and egg production parameters from laying hens: an industry-scale study	Dakota Gold Marketing	Bregendahl	Xin , Roberts	01/01/07 – 12/31/08	\$40,000
Laying hen manure characteristics and air emissions as affected by genetic strains	MPRP & Hy-Line	Xin	Arthur, Burns	03/01/06 – 02/28/07	\$27,160
Field verification of dietary manipulation on ammonia emission and hen performance in high-rise layer houses	EcoCal Products & IEC	Xin	Burns, Bregendahl	01/01/06 – 06/30/07	\$150,000
Air quality for laying hens in cage high-rise, cage manure-belt, and floor aviary housing systems	IEC	Trampel	Xin	01/01/06 – 12/31/06	\$16,255
Partial funding to support acquisition of a thermal desorption system for AFO air quality research	IEC	Kozziel	Xin	07/01/06 – 12/31/06	\$10,000
Comparative evaluation of a new heat lamp fixture and controller	Retrolite of America, Inc.	Xin		12/01/05 – 12/31/05	\$5,800
A systematic evaluation of laying hen housing schemes intended to improve bird welfare	IEC	Xin	Green	10/01/05 – 09/30/07	\$50,840
Developing and validating a process-based ammonia emission model for confinement animal feeding operations	USDA-NRI	R. Zhang	Xin , Fadel (UCD), Ogejo (VPI) & Heber	01/01/06 – 12/31/07	\$496,643 Xin's share: \$100,000
Total suspended particulate, PM10, PM2.5, hydrogen sulfide and hydrocarbon national consent agreement emissions determination from broiler production systems	Tyson Foods	Burns	Xin , Gates, Hoff	10/01/05 – 09/30/07	\$648,231

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
Characterization and mitigation of ammonia and odor emissions from laying hen manure storage and composting	Midwest Poultry Consortium	Xin	Wang, Koziel, Koelkebeck	04/1/05 – 03/31/06	\$53,859
Measurement of ammonia emission rate from broiler production houses	Tyson Foods	Burns	Xin	03/28/05 – 09/28/06	\$399,525
Mitigating ammonia emissions from egg production facilities	Iowa Egg Council	Xin		12/1/04 – 11/30/07	\$100,000
Mitigation of ammonia emissions from layer manure storage	US PEA	Xin	Wang, Liang,	10/01/04 – 09/30/05	\$54,579
Mitigation of ammonia emissions from layer operations by bio/chemical treatment of manure	ISU-AES	Xin	Burns, Hoff, Harmon, Koziel, Wang	10/01/04 – 09/30/05	\$55,000
Development of an improved process-based ammonia model for agricultural sources	Lake Michigan Air Directors Consortium	Gail Tonnesen, UCR/ISSRC	R. Zhang, Xin , et al.	07/01/04 – 03/31/05	\$250,000 Xin's share: \$30,000
Effects of stack surface to volume ratio and air exchange rate on ammonia Emission of Laying Hen Manure Storage	IEC & IPRT	Xin	Richard, Kerr	03/01/04 – 02/28/05	\$44,339
Measurement and mitigation of odor and air emissions from concentrated animal feeding operations	USDA	Kanwar	Hoff, Xin , Harmon	06/01/04 – 09/30/07	\$500,731
Effects of beak-trimming and feed form on turkey poult feeding behavior and growth	USPEA	Noll	Xin	06/01/04 – 05/31/05	\$44,609 Xin's share: \$14,985
Use of bedded hoop structures as an alternative swine housing system to improve environmental soundness and sustainability of water resources	USDA-FAS	Harmon	Xin , Dong	07/01/04 – 06/30/07	\$45,000
Biosystems and Agricultural Engineering Training – Consortium for sustainable plant and animal production systems	FIPSE-DOE	Gates	Xin	09/01/03 – 08/31/08	\$207,000 Xin's share: \$108,000
Reduction of ammonia, odorous volatile organic compounds, and nitrogen excretion by manipulation of crude protein and fermentable fiber levels in laying-hen diets	MPF & NII	Bregendahl	Xin , Russell, Kerr	03/01/04 – 02/28/05	\$51,739
ABE Air Quality Initiative – development of sampling system for downwind emission measurement	IPPA	Hoff	Xin , Bundy, Harmon	07/01/03 – 06/30/04	\$100,000
Determining dynamic CO ₂ release profiles of CO ₂ Pak™	CO ₂ Technology & CATD	Xin	Wang	01/01/03 – 03/31/03	\$18,090

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
Lab evaluation and field verification of Single Point Monitors (SPM's) for measuring aerial ammonia and hydrogen sulfide associated with swine operations	NPB	Xin	Hoff, Richard, Kerr	01/01/03 – 06/30/04	\$80,532
Direct measurement of dietary and management strategy impacts on ammonia volatilization	IPPA	Powers	Lorimor, Xin	07/01/02 – 06/30/03	\$25,500
Reducing ammonia emissions from poultry houses by enhanced manure and diet management	USDA – IFAFS Program	Gates	Xin , Wheeler	10/01/01 – 09/30/03	\$873,754 Xin's share: \$227,960
Improving measurement of emissions from poultry houses	6-SCAWM	Xin	Heber	10/01/01 – 09/30/02	\$163,344 Xin's share: \$67,625
Establishment of baseline data on aerial ammonia concentration and emission rate in Iowa pullet and layer houses	IEC & CATD	Xin	Gates	05/01/01 – 04/30/02	\$53,170
Optimizing partial surface wetting to cool caged layers	USPEA	Xin	Gates, Dixon	07/01/01 – 06/30/02	\$52,279
Poultry environment research (gift)	HLI	Xin		2001	\$15,000
Cooling cage laying hens by partial surface wetting	USPEA	Xin	Gates, Dixon, Beck	07/01/00 – 06/30/01	\$24,000
Evaluation of drinking water temperature on laying hen performance	IEC	Xin	Ahn	04/01/00 – 07/31/00	\$5,000
Training of a Brazilian scholar (Yanagi, Jr.) in poultry environment control	The CAPES Foundation of Brazil	Xin		06/16/00 – 08/06/01	\$8,300
Quantification of feeding and drinking behaviors of poultry for enhanced animal well-being	USDA-NRI	Gates	Xin	09/01/00 – 08/31/01	\$150,709
Minimizing ammonia loss to the atmosphere from high-rise layer facilities	IEC	Lorimor	Xin	06/01/00 – 05/31/01	\$29,050
Use of infrared imaging (IRI) to improve detection of disease in pigs	ILHAC	Halbur	Xin	04/01/00 – 03/31/01	\$19,050
Water quality: Reducing environmental contamination with an emphasis on animal production facilities	USDA Emerging Markets	Reynnells	Brubaker, Xin	10/01/00 – 09/30/01	\$50,000
Effects of heat lamp usage on performance of piglets shortly after birth	AFRDI	Zhang	Xin	01/01/00 – 12/31/01	\$48,000
Updating heat and moisture production rates of poultry and their housing systems	ASHEAE	Xin		04/01/99 – 03/31/01	\$124,572

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
Evaluation and demonstration of livestock waste pollution reduction strategies and practices	USDA-FAS	Xin	Lorimor, Dong	02/01/99 – 01/31/02	\$30,000
Effects of fluctuating temperatures on PIC Isowean pigs	PIC	Xin	Ewan, Harmon, Harris	01/01/99 – 05/31/99	\$28,576
Development of a real time behavior-based swine comfort controller	NPPC	Xin		07/01/99 – 06/30/00	\$18,500
Infrared imaging for on-line, non-contact doneness inspection of chicken meat	USDA-NRI	Tao	Xin	10/01/99 – 03/31/02	\$125,000
Economic evaluation of wean-to-finish production systems	IPPA	Baas	Harmon, Xin	04/01/99 – 03/31/00	\$23,260
Performance evaluation of heat mats in swine farrowing facilities	MAAS	Zhang (UM, Canada)	Xin	09/01/98 – 08/31/99	\$20,800
Environmental impact of the use of poultry manure for agriculture production	IEC, Leopold Center	Kanwar	Lorimor, Xin	07/01/98 – 06/31/04	\$145,100
Environment control for livestock and poultry production	MOA, BFE	Dong	Xin	01/01/98 – 12/31/05	\$150,000+
A novel environmental controller to maximize swine thermal comfort	CATD	Xin		04/01/98 – 12/31/98	\$11,000
Responses of PIC isowean pigs to simulated overseas transportation conditions	PIC	Xin	Ewan, Harmon, Harris	01/01/98 – 05/31/98	\$25,586
Evaluation of high-pressure fogging and low-pressure sprinkling systems for heat stress relief and aerosols suppression in high-rise caged layer houses	CATD and Farmegg Products, Inc	Xin		04/01/98 – 06/30/99	\$33,492
Quantification of postural behavior as thermal comfort indicator to pigs	NPPC	Xin		07/01/98 – 06/30/99	\$18,500
Development and application of an instrumentation system to measure feeding and drinking behavior of poultry as influenced by environment and nutrition interactions	HLI	Xin	Gates	04/01/98 – 03/31/00	\$78,650
Biophysical models for poultry production system	NE127	Xin		10/01/98 – 06/30/05	\$62,000
Image analysis of swine postural behavior to improve thermal comfort	IPPA	Xin	Udpa	07/01/97 – 06/30/98	\$18,000

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
Reciprocal visit by Dr. Hongmin Dong of CAAS for training in swine & poultry environment	ISU-DAIRG	Xin		01/01/98 – 08/31/98	\$1,500
Heat and moisture production of tom turkeys during brooding-growth period	ITF	Xin	Sell	07/01/97 – 12/31/97	\$4,729
Efficacy of Novus 1027™ as an in-transit nourishment for chicks	NII	Xin	Sell	01/01/97 – 06/30/97	\$11,303
Development of an energy conservation education program for Iowa's livestock and poultry industry	Iowa Energy Center	Harmon	Hoff, Xin	07/01/97 – 06/30/99	\$45,074
Alleviating in-transit chick mortality and weight loss via supply of pre-shipment nourishment and improved microenvironment	USPEA	Xin	Sell	05/01/97 – 04/30/98	\$44,179
An innovative method to alleviate stress and subsequent mortality of breeder chicks for long-journey overseas shipments	USPEA	Xin	Sell	05/01/96 – 04/30/97	\$40,268
Determination of high-rise layer house manure volume and nutrient content	USPEA	Xin	Lorimor	01/01/97 – 12/31/97	\$39,215
Economic evaluation of finishing facilities and development of a decision-aid energy estimator program for the swine industry	Iowa Pork Industry Center	Harmon	Hoff, Xin	04/01/96 – 03/31/97	\$13,400
A novel environmental controller to maximize swine thermal comfort	ISU-SPRIG	Xin	Udpa	01/01/97 – 12/31/97	\$7,886
Environment control for livestock and poultry production	MOA, BFE	Dong	Xin	01/01/95 – 12/31/97	\$50,000+
Dietary acid-base treatment on heat stress and the biochemical parameters of turkey breast muscle	ITF	Ahn	Sell, Xin	07/01/96 – 12/31/96	\$2,400
Development of LIFE (Livestock Industry, Facilities and Environment) Ed. Series	ISU – Office of VP for Extension	Glanville	Harmon, Lorimor, Xin	09/01/96 – 08/31/97	\$70,000
Energy savings in swine production through use of energy efficient lighting and heat lamps	Iowa Energy Center	Xin	Bundy	07/01/94 – 06/30/98	\$159,754
Procurement of a state-of-the-art infrared thermal imaging camera	Iowa Energy Center	Xin		07/97	\$11,000
Alleviating long-journey chick stress and subsequent mortality via improved design and microenvironment of transport containers	Hy-Line International	Xin		07/01/94 – 06/30/96	\$31,957
An innovative chick shipping container	CATD	Xin		09/01/95 – 03/31/96	\$14,142
Training of a Russian scholar in animal production systems	RSCHE	Xin		01/05/95 – 12/09/95	\$19,743

Funded Research Grants/Contracts (in chronological order):

Project Title	Grantor	PI	Co-PI	Period	Amount
Biophysical models for poultry production system	NE127	Xin		10/01/94 – 09/30/98	\$25,000
Development of an animal environment research laboratory (gift)	Agri-Tech, Inc.	Xin		1994	\$5,040
Responses of poultry to environmental control schemes in cold climates	ISU-COE	Xin		01/17/94 – 05/31/94	\$4,000
Monitoring turkey house air quality in southeast Iowa	ITMC	Xin	Owings, Trampel	05/01/94 – 04/30/95	\$2,000

ADVISING/MENTORING/HOSTING OF STUDENTS/POST-DOCS/VISITING PROFESSORS

Name	Degree	Thesis Title or Area of Training	Support^{\$}	Start	Finish
Acevedo, Ricardo	M.S.	Use of dynamic emission chamber to quantify emissions from high-rise layer houses	G	Aug 08	Aug 10
Chepete, Justin [@]	M.S.	Evaluation of intermittent partial surface wetting to relieve laying hens of heat stress	S/G	Jun 97	May 99
Cook, Rachel ^{+,%}	M.S.	Effect of cage stocking density on feeding behavior of laying hens	C/G	Aug 03	June 05
Ehr, Isa	M.S. (co-adv)	Production and health responses of poultry to dietary omega-3 fatty acids supplementation	G	Jan 13	Aug 17
Han, Tao	M.S.	Performance and energetics of neonatal chicks as influenced by in-transit lighting	G	Jun 95	May 97
Hu, Jianing	M.S.	Automatic image selection and segmentation of swine thermal comfort behavior	G	Aug 96	Dec 97
Lee, Kichang [*]	M.S.	Characterizing physiological and energetic responses of young chicks to stress relief measures for long-distance air transport	G	Jan 95	May 96
Long, Hongqian	M.S.	Evaluation of LED vs. fluorescent lighting in aviary hen houses	CSC/G	Sept 13	Sept 14
Mendes, Luciano	M.S.	Ammonia emissions of pullets and laying hens as affected by stocking density	G	Aug 08	Aug 10
Ning, Xiaopeng	M.S.	Characterizing ammonia emission dynamics of poultry	G	Aug 06	Dec 08
Pepple, Laura	M.S.	Impact of feeding DDGS to swine: emissions and potential management strategies	G	Aug 09	May 11
Persyn, Kelly [%]	M.S.	Feeding behaviors of pullets and laying hens with or with beak-trimming	C/G	Aug 01	May 03
Yang, Peilin ^{&}	M.S.	Nitrogen loss from laying hen manure in high-rise layer houses	G	Jun 97	Dec 99
Wilco .J.M. Verhoijisen	M.S. (visiting)	Development of an automated monitoring system for quantification of poultry behaviors	S/G	Aug 14	Dec 14
Ye, Wenyu	M.S.	Quantifying thermal comfort behavior of young pigs using thermography	G	Jan 98	Aug 99
Andersen, Heidi	Ph.D. (visiting)	Automatic climate control of swine houses	S	Sept 05	Dec 05
Chepete, Justin H. ^{***}	Ph.D.	Determination of heat and moisture production rates of modern poultry and housing systems	G	Aug 99	May 02
Davis, Jeremiah ^{++,%}	Ph.D.	Monitoring cattle locomotion and ingestion behavior via remote sensing	C/G	Jan 04	Jun 07
Green, Angela [%]	Ph.D.	A systematic evaluation of laying-hen housing systems for improved hen welfare	NSF Fellow/G	Aug 04	Jan 08

ADVISING/MENTORING/HOSTING OF STUDENTS/POST-DOCS/VISITING PROFESSORS

Name	Degree/ Position	Thesis Title or Area of Training	Support^{\$}	Start	Finish
Hayes, Morgan [§]	Ph.D.	Alternative housing systems for laying hens	G	Aug 08	May 12
Leonard, Suzanne	Ph.D.	Enhancing the health and well-being of pre-weaning piglets and sows	G	May 16	
Li, Hong ⁺⁺	Ph.D.	Ammonia emissions from manure belt laying hen houses and manure storage	G	Aug 02	May 06
Liu, Kai [§]	Ph.D.	Alternative housing and lighting for pullets and laying hens	CSC/G	Aug 12	Dec 16 (expect)
Ma, He	Ph.D.	Responses of poultry to lighting intensity	CSC/G	Oct 12	Dec 14
Nakarmi, Akash	Ph.D.	Automated quantification of group-housed laying behaviors (co-advisor with Dr. Tang)	G	Oct 09	May 13
Roberts, Stacey	Ph.D.	Mitigation of ammonia emissions from laying hen houses via dietary manipulation	G	Aug 06	Aug 09
Severo, J. Abreu	Ph.D.	Measurement and mitigation of gaseous and particulate emissions from poultry houses	G	Aug 06	Resigned
Shao, Bin	Ph.D.	Development and evaluation of a behavior-based swine environment controller	G	Jan 98	Dec 03
Shao, Junqing ^{**}	Ph.D.	Quantification of thermal needs of young pigs by image analysis of postural behavior	D/G	Aug 94	Dec 97
Stinn, John ^{%%}	Ph.D.	Greenhouse gas emissions from breeding, gestation and farrowing swine facilities	G	Aug 10	Aug 14
Oliveira, Jofran	Ph.D.	Behaviors and performance of laying hens as affected by resource and management in alternative housing	S/G	Aug 15	
Tao, Xiuping	Ph.D.	Responses of market-size broilers to acute thermal challenge and surface cooling	G	Aug 01	Jun 02
Wang, Kailao	Ph.D.	Automatically tracking behaviors of individual birds in group settings	CSC/G	Oct 17	
Wang, Yu	Ph.D.	Quantifying and enhancing ventilation performance in cage-free hen housing	CSC/G	Oct 17	
Yanagi, Tadayuki	Ph.D.	Optimization of direct surface evaporative cooling for laying hens	S/0.35G	Jun 00	Feb 02
Zhou, Hongsen [*]	Ph.D.	Behavior-based assessment of thermal needs of piglets from birth to weaning	G	Aug 94	May 98
Li, Hong	Associate Scientist	Quantification and mitigation of air emissions for animal feeding operations	G	Aug 07	Nov 10
Shepherd, Tim	Assistant Scientist	Quantification and mitigation of air emissions for animal feeding operations	G	Nov 10	Aug 14
Zhao, Yang	Assistant Scientist	Measurement of aerial emissions from laying-hen housing systems	G	Jul 15	Dec 16

ADVISING/MENTORING/HOSTING OF STUDENTS/POST-DOCS/VISITING PROFESSORS

Name	Degree/ Position	Thesis Title or Area of Training	Support^{\$}	Start	Finish
Chai, Lilong	Post-doc	Mitigation of air emissions from alternative hen housing systems	G	Oct 15	
Li, Hong	Post-doc	Quantification and mitigation of air emissions from poultry production facilities	G	May 06	Jul 07
Li, Shuhai	Post-doc	Mitigation of air emissions from poultry houses and manure storage	G	Sept 08	Aug 09
Li, Xiwei	Post-doc	Optimizing heating systems for swine production	G	Nov 97	Feb 98
Liang, Yi	Post-doc	Measurement of ammonia emissions from poultry houses	G	Jun 02	July 05
Puma, M.C.	Post-doc	Poultry housing and ingestion behavior	G	Jul 97	June 01
Rahman, S.	Post-doc	Quantification and mitigation of air emissions from poultry houses	G	Mar 06	Jan 07
Tanaka, Akihiro	Post-doc	Improvement of thermal and nutritional conditions during long-distance shipment of day-old breeder chicks	G	Aug 95	Sept 96
Zhao, Yang	Post-doc	Measurement of aerial emissions from laying-hen housing systems	G	Jun 11	Jun 15
Mohd-Ali, Rudy	Research Associate	Measurement of ammonia emission from poultry housing systems	G	Oct 01	Mar 02
Abe, Yoshiyuki	Senior Researcher	Air quality and heat stress relief engineering for livestock production	PDL	Nov 13	Nov 14
Atilgan, Atilgan	Visiting Prof.	Air quality related to animal production operation	PDL	Jan 11	April 11
Atilgan, Atilgan	Visiting Prof.	Means to quantify gaseous and PM concentrations and emissions of animal production facilities	PDL	Aug 14	Jul 15
Chen, Yongxing	Visiting Researcher	Quantification of air emissions from animal production facilities	G	July 11	Dec 11
Chepete, Justin H.	Visiting Prof.	Measurement, modeling and mitigation of air emissions from poultry operations	G	July 09	June 10
Dong, Baocheng	Visiting Researcher	Quantification of air emissions from animal production facilities	G	July 11	Aug 12
Dong, Hongmin	Visiting Prof.	Environment control for livestock and poultry production	0.50PDL 0.50G	Mar 98	Dec 98
Gates, Richard S.	Visiting Prof.	Ingestion behavior of poultry as influenced by nutrition and thermal modifications	0.5PDL 0.5G	Aug 00	July 01
Grebennik, D.V.	Visiting Researcher	Poultry production systems and technologies	G	Jan 95	Dec 95

ADVISING/MENTORING/HOSTING OF STUDENTS/POST-DOCS/VISITING PROFESSORS

Name	Degree/ Position	Thesis Title or Area of Training	Support^{\$}	Start	Finish
He, Jincheng	Visiting Professor	Quantification of animal behaviors through image analysis and wireless sensing	PDL	Oct 13	Oct 14
Ikeguchi, Atsuo	Visiting Researcher	Suppression of aerosols and reduction of heat stress in layer house by misting	G	Apr 98	Oct 98
Lao, Fengdan	Visiting Professor	Quantification of animal behaviors and health status through image analysis	PDL	Aug 14	July 15
Li, Lihua	Visiting Professor	Assessment of poultry behaviors in alternative hen housing systems	PDL	Feb 15	Feb 16
Rossnegal, Alyssa A.	Co-op Researcher	Quantification of ammonia emission from poultry housing systems	G	May 03	Dec 03
Severo, J. C. Abreu	Visiting Researcher	Alternative methods for measuring gaseous emissions from animal production facilities	G	Feb 06	July 06
Tanaka, Akihiro	Visiting Researcher	Quantification of ammonia emission from poultry production facilities	G	Dec 01	June 02
Tang, Xiangfang	Visiting Researcher	Bioenergetics, air quality and animal-environment interactions	G	April 10	Sept 10
Zhang, Qiang	Visiting Prof.	Bioenergetics and environmental physiology	0.8PDL 0.2G	Aug 98	Jul 99
Zhao, Deling	Visiting Prof	Animal environment and air quality	PDL	Sept 12	Aug 13
Zheng, Weichao	Visiting Researcher	Air quality in animal housing	CSC	June 12	Oct 12
Zhu, Zhiping	Visiting Researcher	Measurement and mitigation of air emissions from animal housing	G	Jan 06	Sept 06

- ^{\$} S = Scholarship; G = Research Grant (½ RA for grads, full time for post-docs); D = Dept. RA support; C = College RA award; PDL = Professional Development Leave supported by scholar's home institute, CSC = China Scholarship Council
- + Recipient of the ABE Howard Johnson Outstanding MS Student in Agricultural Engineering Award (2005) and ISU Miller Fellowship (2003-2005); Winner of the ASAE MS Graduate Student Research Award competition (2005)
- ++ Recipient of Rev P.T. Taiganides Award for Outstanding Ph.D. Students in Agricultural Engineering
- @ Recipient of the ABE Howard Johnson Outstanding MS Student in Agricultural Engineering Award (1999)
- * Co-recipient of an ASAE Superior Paper Award (1997)
- ** Recipient of 1997 Rev P.T. Taiganides Award for Outstanding Ph.D. Students in Agricultural Engineering; and 1997 Mid-Central ASAE Outstanding Graduate Student of the Year Award.
- *** Recipient of 2001 "All but Dissertation Award" from the ISU Graduate College; and 2002 Rev P.T. Taiganides Award for Outstanding Ph.D. Students in Agricultural Engineering. Resumed faculty position at the University of Botswana.
- & Co-advisor with Dr. Jeff Lorimor
- ♣ Co-recipient of ASAE Superior Paper Award (2000)
- % Recipient of Henry Giese Structures and Environment Fellowship
- %% Recipient of Henry Giese Structures and Environment Fellowship (three times); Recipient of ISU 2013 Brown Graduate Student Fellowship (\$10,000); Recipient of ISU 2013 Outstanding Graduate Research Award; Recipient of 2013 Rev P.T. Taiganides Award for Outstanding Ph.D. Students in Agricultural Engineering; Recipient of 2013 ASABE Iowa Section Outstanding PhD Graduate Student Award
- § Recipient of Iowa State University Outstanding Graduate Research Award

Current employment/positions of some former advisees:

- Dr. Yoshiyuki Abe (Visiting Researcher, 2013-2014), Senior Researcher, Agriculture Forestry and Fisheries Research Council, Ministry of Agriculture Forestry and Fisheries, Tokyo, Japan
- Dr. Atilgan Atilgan (Visiting Researcher, 2011 & 2014-2015), Professor and Head, Department of Agricultural Structures and Irrigation, Suleyman Demirel University, Turkey
- Dr. Justin H. Chepete (M.S., 1999; PhD, 2002), Professor and Head, Department of Agricultural and Biosystems Engineering, Botswana University of Agriculture, Gaborone, Botswana
- Dr. Yonxing Chen (PhD – joint training, 2012), Assistant Professor, Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agri. Sciences (CAAS), Beijing, China
- Dr. Jeremiah Davis (PhD, 2007), Associate Professor of Agricultural and Biological Engineering and Associate Director of National Poultry Technology Center, Auburn University, AL
- Dr. Hongmin Dong (Visiting Researcher, 1998), Professor and Deputy Director General, Institute of Environment and Sustainable Development in Agriculture, CAAS, Beijing, China
- Dr. Angela Green (PhD, 2008), Associate Professor, Department of Agricultural and Biological Engineering, University of Illinois, Urbana-Champaign, IL
- Dr. Morgan Hayes (PhD, 2012), Assistant professor, Department of Biosystems and Agricultural Engineering, University of Kentucky, Lexington, KY
- Dr. Atsuo Ikeguchi (Visiting Researcher, 1999), Professor of Bioresource Engineering, Utsunomiya University, Tochigi, Japan
- Dr. Kichang Lee (MS, 1996), Research Scientist, Harvard-MIT Division of Health Sciences and Technology, Cambridge, MA
- Dr. Fengdan Lao (Visiting Researcher, 2014-2015), Associate Professor, China Agricultural University, Beijing, China
- Dr. Hong Li (PhD, 2006), Assistant Professor, Department of Food and Animal Sciences, University of Delaware, Newark, DE
- Dr. Xiaopeng Ning (MS, 2008), Assistant Professor, Industrial and Management Systems Engineering, West Virginia University, WV
- Dr. Shuhai Li (Post-doc, 2008–2009), Associate Professor, Nanjing Agricultural University, China
- Dr. Yi Liang (Post-doc, 2002–2005), Associate Professor, Department of Biological and Agricultural Engineering, University of Arkansas, Fayetteville, AR
- Dr. Shafiqur Rahman (Post-doc, 2006–2007), Associate Professor, Department of Agricultural and Biological Engineering, North Dakota State University, Fargo, ND
- Dr. Stacey Roberts (PhD, 2009), Poultry Nutritionist, Provimi, Brookville, OH
- Dr. Bin Shao (PhD, 2003), Software Development Engineer, Motorola Company, Chicago, IL
- Dr. John P. Stinn (PhD, 2014), Environmental Services Manager, Iowa Select Farms (the largest swine company in Iowa and ranks 4th largest swine company in the US), Iowa Falls, IA
- Dr. Akihiro Tanaka (Post-doc, 2001–2002), Chief Researcher, National Agriculture Research Center for Kyushu and Okinawa Regions, Kyushu, Japan
- Dr. Xiuping Tao (PhD – sandwich program, 2002), Professor, Institute of Environment and Sustainable Development in Agriculture, CAAS, Beijing, China
- Dr. Tadayuki Yanagi, Jr. (PhD – sandwich program, 2002), Professor, Department of Engineering, Associate Provost for Graduate Education, Universidade Federal de Lavras, Lavras, MG, Brazil
- Dr. Yang Zhao (Post-doc/Assistant Scientist, 2011–2016), Assistant Professor, Department of Biological and Agricultural Engineering, Mississippi State University, MS
- Dr. Zhiping Zhu (PhD – sandwich program, 2006), Professor, Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences, Beijing, China

EXTENSION/OUTREACH PROGRAMS

a. Leadership with the Egg Industry Center (2008 – present)

The Egg Industry Center (EIC, <http://www.eggindustrycenter.org>) was established in 2008, located at Iowa State University. The mission of EIC is *to add value to the egg industry by facilitating research and learning for egg producers, processors and consumers through national and international collaboration*. Dr. Xin has been serving as director of EIC since its inception. EIC is also staffed with a Program Manager-Business Manager, a Communications Specialist and a part-time Office Assistant. A 15-member Advisory Board that consists of egg producers, allied industry representatives, government officials, and academic scientists/administrators provides consultation and guidance about development of the EIC program priorities. EIC had set a goal to establish a \$10 million endowment (private funding) to support its research programs. To date, \$6 million has been raised. EIC has been serving the egg industry, academia, government and the general public by:

- Conducting issue-oriented research projects (e.g., highly pathogenic avian influenza or HPAI, hen housing systems, carbon footprint analysis of egg production and processing) and timely dissemination of the research finding;
- Being a research-based clearinghouse for the industry, academia and the general public regarding egg production, procession and consumption;
- Providing up-to-date industry statistics and economic analysis/forecasting. Today, the EIC's monthly reports of egg industry statistics and economic analyses are reaching over 1,250 recipients worldwide.
- Providing Weekly Media Updates on topics germane to egg production, processing and utilization.
- Holding annual egg industry issues forums at various geographical locations in the country (Des Moines, IA; Chicago, IL; Columbus, OH; Denver, CO; St Louis, MO; Indianapolis, IN) to address current and emerging issues that affect the egg industry and the consumers.
- Funding research/extension/educational efforts to address current and emerging issues. To date EIC has either jointly or solely funded a number of multi-state, multi-disciplinary projects concerning impact of alternative hen housing systems, environmental footprint assessment of egg production, and egg safety associated with various housing types.
- Developing/facilitating national and international partnerships and collaborations to address issues that are commonly facing the egg industry, e.g., American Egg Board (AEB), United Egg Producers (UEP), and International Egg Commission (IEC).

The EIC extension/educational deliverables are distributed to more than 1,250 national and international recipients covering egg producers (>90% U.S. egg producers) and companies, allied industries (breeder, equipment), government agencies, and researchers and extension personnel in academia. Although EIC is physically located at ISU, its programs and activities are national and international in nature.

b. Leadership of ABE Extension Program in Serving the Poultry Industry (with official extension appointment from Dec 1993 to March 2017)

Dr. Xin led the ABE departmental extension program in serving the state, regional and national poultry industry. In addition to producing the extension publications listed previously, Dr. Xin conducts the following extension/outreach programs:

- Providing leadership at the national level in addressing environmental (air quality) issues facing the egg industry. For instance, Dr. Xin has been serving as the chair of the United Egg Producers Environmental Scientific Panel (ESP) since 2004 (UEP represents over 90% of the U.S. egg producers). The missions of ESP are a) to serve as the clearinghouse for the egg industry regarding environmental issues related to egg production and state of science on environmental research; and b) to explore practical means and make recommendations on best management practices to improve indoor air quality and mitigate air emissions of egg production facilities. The 14-member ESP consists of leading university researchers (Iowa State University, Pennsylvania State University, Purdue University, University of Illinois, The Ohio State University), allied industry representatives, producer representatives, and government agency (USDA).

As a result of the ESP's collective effort, a USDA-CIG project completed in 2010 in Iowa and Pennsylvania demonstrated that use of dietary manipulation is a viable means to mitigate ammonia (major noxious gas in poultry houses) emissions and improve manure nutrient contents for laying-hen houses. The mitigation technology has been adopted by egg producers.

- Conducting educational programs on issues of animal (particularly poultry) production air quality, environmental control and production sustainability via invited and participatory presentations at local, regional, national and international extension workshops and symposia.
- Providing technical consultation to animal (poultry in particular) producers and allied industries regarding engineering and management issues related to animal production.
- Serving on board of directors or advisory councils for commodity groups (e.g., Iowa Egg Council, Iowa Poultry Association, Iowa Turkey Federation, United Egg Producers, American Egg Board, National Pork Producers Council) and governmental agencies (USDA)
- Integrating emerging animal industry issues into applied research/demonstration projects, which have led to timely, research-based solution or information, therefore significant impacts on the livestock and poultry industries at state and national levels. Examples of such integrated projects include:
 - Quantification and mitigation of air emissions from poultry production operations
 - Improving the quality and efficiency of shipping poultry and swine breeder stocks worldwide
 - Devising cost-effective methods for combating summer heat stress in commercial laying hen houses
 - Establishing research-based data on manure nutrient production from laying hen facilities, which have been adopted in the state (IDNR) guidelines for developing manure management plans.
 - Improving energy efficiency of creep heating and microenvironment in the swine farrowing operation
 - Helping an Iowa-based swine equipment manufacturing company to improve design and quality of heat mat for creep heating
 - Assisting equipment manufacturers in developing heat mat and controllers for swine creep heating
 - Field demonstration of dietary manipulation to reduce ammonia emissions while maintaining or enhancing production efficiency for laying-hen operations
- Developing and maintaining strong partnerships/network with state and national commodity groups, inter-state institutional and governmental agencies to enhance outreach programs
- Supporting agricultural engineering field specialists, as needed, in carrying out their extension programs. The support is in the form of annual in-serve training, collaboration on field demonstration projects, and answering technical questions.
- Producing/contributing to over 60 extension publications, media reports and popular press articles

SERVICE ACTIVITIES

a. University, College and Departmental Committees Served

- University Conflict of Interest Management Committee (2016–2019)
- University Distinguished Professor Nominations Review Committee (2016–2018)
- Search Committee for the ISU Vice President for Research (Sept–Dec 2013)
- University Graduate Faculty Term Membership Review Committee (2003–2006)
- College of Agriculture and Life Sciences (CALS) Air Quality Issue Team (2003–present)
- CALS Avian Influenza Issue Team (2006–2010)
- CALS Distinguished Professor Screening Committee (2015)
- CALS Diversity Committee (1997–2001; 2009–2010; 2010–2011)
- CALS Promotion and Tenure Advisory Committee (2003–2006)
- CALS New ISU Poultry Farm Planning Committee (Chair, 2017–)
- College of Engineering Committee on Research Strategy (2012–2015)
- College of Engineering Honors and Awards Committee (2007–2010)
- College of Engineering Promotion and Tenure Committee (2007–2010, 2012-subbing)

- College of Engineering Graduate Education Task Force Committee (2003–2005)
- College of Engineering Research Award Committee (1998–2002; 2011–2014)
- College of Engineering Honors and Awards Committee (2004–2007; 2007–2010)
- ABE ad-hoc faculty search committees
- ABE Awards Committee (2016)
- ABE Department Research Council (2016–)
- ABE Agricultural Engineering Research Center (AERC) Committee (2000–2001)
- ABE Animal Production Systems Engineering Focus Group Leader (2003–2009)
- ABE Awards and Publicity Committee, Chair (2007–2008)
- ABE Chair Advisory Committee (2004–2009)
- ABE CSREES Academic Review Executive Committee (2003–2004)
- ABE Diversity Committee (2009–2010; 2010–2011), Chair (2009–2010)
- ABE Director of Graduate Education (DOGE) (2003–2005)
- ABE Graduate Programs Committee (1994–2008; Chair, 2003–2005; 2012–2013; 2013–2014; 2014–2015; 2015–2016; 2016–2017)
- ABE-IEdT ad-hoc merger committee (2003–2004)
- ABE New Building Feasibility Study and Planning Committee (2004–2012)
- ABE International Programs Committee (1997–2003; 2010–2011; 2011–2012; VC 2011–2013; 2013–2014; 2014–2015)
- ABE junior faculty mentor (Dr. Stuart Brirell, 1998–2001; Dr. Jacek Koziel, 2004–2006; Dr. Kurt Rosentrater, 2011–2015)
- Faculty mentor for Dr. Yuko Sato, assistant professor of VDPAM, CVM (2015–)
- ABE Professional Development and Awards Committee (1997–2008, Chair 2004–2005)
- ABE Promotion and Tenure Review Committee (1995–1996; Chair 2003–2004; 2005–2006; 2010–2011; 2011–2012; 2014–2015)
- ABE Space Advisory Committee, Chair (2011–2013)
- AnSci Animal Industry Report, Editor on Poultry Section (2010–present)
- AnSci Poultry Nutrition Faculty Search Committee (2009)
- AnSci Poultry Nutrition Faculty Search Committee (2014)
- GPSA (Grad Program in Sustainable Ag) Admissions Committee (2000–2005)
- VDPAM Poultry Faculty Search Committees (2015, 2017)

b. Professional/Government/Commodity Organizations

- Overseas Chair, Board of Directors for the International Research Center for Animal Environment and Welfare (IRCAEW) headquartered at Chongqing Academy of Animal Sciences, Chongqing, China (2012–2016; 2016–2020)
- Co-chair of the International Symposium on Animal Environment and Welfare sponsored by the International Research Center for Animal Environment and Welfare (www.ircaew.org), Oct. 22–24, 2011; Oct. 19–22, 2013; Oct 23–26, 2015; Oct. 23–26, 2017; Chongqing, China
- Co-chair of the First Asian Precision Livestock Farm Conference (1st PLF-Asia) sponsored by the International Research Center for Animal Environment and Welfare (www.ircaew.org), China Agricultural University, September 9–11, Beijing, China
- Member of the UEP Scientific Advisory Committee on Animal Welfare (2012–present)
- Member of the United Egg Producers Ammonia Task Force (2013–present)
- Member of the National Pork Producers Council Air Science Committee (2011–present)
- Member of the American Egg Board Science Advisory Committee on Production (2010–present)
- Ex-officio Board Member of the Iowa Egg Council (2008–present)
- Ex-officio Board Member of the Iowa Turkey Federation (2008–2010)
- Chair of United Egg Producers Environmental Scientific Panel on Air Emissions (2004–present)
- Director of Egg Industry Center located at Iowa State University (2008–present)

- Member of the USDA Agricultural Air Quality Task Force (AAQTF) (2008–2015, three terms)
- Member of the USDA-NRI Air Quality Program Review Panel (2007)

ASABE (American Society of Agricultural and Biological Engineers):

- Planning Committee for the 10th International Livestock Environment Symposium (2016–)
- Planning Committee for the 9th International Livestock Environment Symposium (2010–2012)
- Program Chair of the 8th International Livestock Environment Symposium (2006–2008)
- Planning Committee Member and Local Host Co-chair for 7th International Livestock Environment Symposium (2003–2005)
- Program Chair of the Structures and Environment (SE) Division (2002–2005)
- Associate Editor of SE Division (1994–2004; 2009–2011)
- SE Representative of the Meetings Council (2003–2006)
- Publications Council - SE Representative (1999–2002)
- P-511 Refereed Publications, SE Liaison (1996–1999)
- SE-04 Paper Awards (Chair, 1996–1997; Vice Chair, 1995–1996; Secretary, 1994–1995)
- SE-301 Environmental Physiology (Chair:1996–1997; Vice Chair:1995–1996; Sec:1994–1995)
- SE-302 Environment of Animal Structures (Chair: 1998–1999; Vice Chair:1997–1998; Sec: 1996)
- SE-405 Poultry Housing Systems (Chair, 2001; Vice Chair, 2000; Secretary, 1999–2000)
- P-511 Refereed Publications, SE Liaison (1996–1999)
- Coordinator for numerous technical sessions at the annual international meetings.

ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers):

- Chair of TC 2.2 Handbook Committee (2000–2003)

CIGR (International Commission of Agricultural Engineers)

- Co-chair of the International Symposium on Environment, Health and Animal Welfare, Oct. 19–22, 2011, Chongqing/Rongchang, Sichuan, China
- Organizing Committee member and Proceedings Co-chair of CIGR Section II Working Group Workshop on “*Animal Housing in Hot Climates*”, Oct 22–25, 2009, Chongqing, China
- Editorial Board Member for CIGR e-Journal (2000–present)

Association of Overseas Chinese Agricultural, Biological and Food Engineers

- Member of Board of Directors (2001–2005); Vice President (2002–2003)

Regional Research Project: NE127 - Biophysical Models for Poultry Production Systems

- Chair (1998–99; 2005–2006); Senior Executive Officer (1997–98; 2004–2005); Junior Executive Officer (1996–97; 2003–2004)
- Co-Chair of committee for project renewal for the period of Oct 1999 to Sept 2004

Manuscript and Proposal Review:

- Regular reviewer of ASABE, ASHRAE, CSAE (Canadian Society of Agricultural Engineers), CIGR, Poultry Science, Applied Poultry Research, Animal Science, World Poultry Science, and USDA-ARS technical papers, averaging 8 to 10 papers per year.
- Ad-hoc reviewer of research proposals for USDA Small Business Innovation Research (SBIR) program, National Research Initiative (NRI) program, BARD, international research institutes or agencies, domestic foundations, universities, and industry companies.

c. Graduate Program Committee Member

Name	Degree Sought	Department	Period
Davies, Simmon	Ph.D.	ABE	June '96 – July '97
Green, J.J.	M.S.	AnSci	Aug '09 – July '11
Hansen, Hannah	M.S.	FSHN	Aug '13 – May '15
Heubner, Minda	M.S.	ABE	Aug '02 – Aug '04
Johnson, Jay	Ph.D.	AnSci	Jul '10 – May '14
Kang, Juhyon	M.S.	FSHN	Aug '10 – Dec '12
Kang, Juhyon	Ph.D.	FSHN	Jan '13 – July 2015
Liu, Lei	M.S.	FSHN	June '96 – May '99
Lo, Miranda	M.S.	ABE	Jan '05 – May '06
Roberts, Stacey	M.S.	AnSci	Aug '04 – May '06
Ramirez, Brett	Ph.D.	ABE	Aug '14 – Oct '17
Swestka, Randy	M.S.	ABE	Jan '09 – May '10
Wu, Wei	M.S.	AnSci	Aug '04 – June '06
Yang, Peilin	Ph.D.	ABE	Jan '00 – July '02
Yu, Naiwen	Ph.D.	ABE	Jan '95 – Dec '98

INTERNATIONAL PROGRAMS/ACTIVITIES AND ACCOMPLISHMENTS**Academic Collaborations and Capacity Building with International Institutions**

- Since 1996 Dr. Xin has been conducting academic collaborations and capacity building with the Chinese Academy of Agricultural Sciences (CAAS) and China Agricultural University (CAU) in the areas of air quality, animal production systems, environmental control, and animal welfare. The collaborations have been in the forms of conducting educational workshops/symposia at CAAS and CAU, exchange of faculty, joint training of CAAS and CAU graduate students – especially PhD students (in Beijing and at ISU), joint research projects funded by USDA-Foreign Agricultural Service, China Ministry of Agriculture, and China Ministry of Science and Technology, and technical publications in international journals. A special accomplishment of the collaboration with CAAS is the establishment of a China-US Agro-environmental Center of Excellence (CUACE) based at CAAS in Beijing since 2002. Sponsored by USDA-FAS, Dr. Xin played a key role in the center's establishment. The first of its kind in China, the center has been serving as the clearinghouse and think-tank for developing national policies and plans on environmental issues and sustainable animal production in China. Working closely with Professor Hongmin Dong, Director of the center and Deputy Director General of the institute, Dr. Xin has been instrumental to the development and implementation of the center's mission and goals. An example of the collaborative endeavors is the project on "Evaluation of Greenhouse Gas Emissions Reduction through Use of Biogas Digesters for Swine Manure" jointly funded by the U.S. EPA (Global Methane-to-Market Program) and China Ministry of Agriculture. Since 1996 Dr. Xin has been holding the title of Honorary Professor of CAAS and CAU. In 2008 he was appointed an Adjunct Professor of CAU to further his collaboration and capacity building with CAU. For instance, he is now serving on the Scientific Advisory Committee of the CAU Key Laboratory on Agricultural Structures and Environment. Each year Dr. Xin spends 2-4 weeks at CAAS and CAU, conducting academic exchange and training of graduate students. To date, Dr. Xin has participated in/contributed to advising of more than 30 graduate students at CAAS and CAU. A formal MOU between CAU and ISU was signed at CAU in summer of 2015 by ISU President Steven Leath and CAU President Ke Bingsheng. Dr. Xin facilitated the MOU signing process.
- Since 1998 Dr. Xin has been conducting academic collaborations and capacity building with two Brazilian universities, Federal University of Viçosa (UFV) and the Federal University of Lavras (UFL) in the areas of animal production environment and animal welfare. In addition, over the past 10+ years Dr. Xin has expanded the academic engagement with the University of Campinas. Once again, the collaborations take the forms of educational workshops at UFV and UFL, reciprocal visits/exchange of faculty, joint training of Brazilian undergraduate and graduate students (in Brazil and at ISU), joint research and educational projects funded by US and Brazilian agencies, and technical publications in international journals. Specifically, between 2002 and 2012, Dr. Xin served as co-advisor or committee member for more than 10 graduate students at UFV through a Sandwich Program. Two Memorandums of Agreement (MOAs) between UFV and ISU and between UFL and ISU have been in operation to facilitate the academic exchange, and Dr. Xin serves as the coordinator of the MOAs. During the period of 2004-2008, through a competitive grant funded by the US Department of Education (FIPSE) and the Brazilian CAPES Foundation, a US-Brazil Educational Consortium was established to train U.S. and Brazilian undergraduate students in agricultural and biosystems engineering, and Dr. Xin served as the ISU project director (in collaboration with University of Kentucky). Through the consortium project, 14 ISU undergraduate students studied at UFV and 14 Brazilian students studied at ISU for one semester. During the project period, Dr. Xin engaged the exchange Brazilian undergraduate students in research projects in his lab. The feedbacks from both ISU and Brazilian students were extremely positive. Subsequently a new FIPSE-CAPES project was awarded (2009), allowing the successful academic exchange/collaborations to continue. Dr. Brian Steward served as the ISU coordinator of the new project.
- In 2011 Dr. Xin, together with Dr. Max Rothschild (Distinguished Professor of Animal Science), co-led the ISU Ensminger Exchange Program Team (6 members) to China, where the team conducted academic changes in Beijing (Chinese Academy of Agricultural Sciences – Institute of Animal Science) and Huazhong Agricultural University in Wuhan City. The exchange program enhanced the existing

academic collaborations and planted seed for future, long-term academic cooperation/collaboration, particularly among the young scientists from both sides.

- In October 2011, at the invitation of the Chongqing Academy of Animal Sciences (China), Dr. Xin played a key role in establishing the International Research Center for Animal Environment and Welfare headquartered in Chongqing (www.ircawe.org). The purposes of the Center are: First, utilize research capabilities and resources of Chinese and international scientists and institutions, synthesize successful experience and proven management practices, and apply new technologies from various countries to advance the knowledge and technologies in animal environment and welfare worldwide. Second, provide a platform for global networking and exchange to advance animal environment research, improve animal health and welfare, production efficiency and product quality, and ultimately improve the quality of life for mankind. Current 19 participating institutions are: China Agricultural University, Chongqing Academy of Animal Sciences, Northeastern Agricultural University, Nanjing Agricultural University, South China Agricultural University, Iowa State University, Purdue University, University of Illinois, University of Missouri, The University of Tennessee, The Ohio State University, University of Manitoba (Canada), University of Southern Queensland (Australia), Wageningen University and Research Center (The Netherlands), Aarhus University (Denmark), Catholic University of Leuven (Belgium), University of Campinas (Brazil), University of Milan (Italy), and Josip Juraj Strossmayer University of Osijek (Croatia). More institutions are expected to join the Center. Dr. Xin was appointed as the Overseas Co-chair of the inaugural BOD, along with Dr. Baoming Li of CAU as the Chinese Co-chair for a 4-year term. In 2016 Dr. Xin and Dr. Li were reappointed for another 4-term as the co-chairs of the center. Since 2011, every odd-number year, an International Symposium on Animal Environment and Welfare has been held in October (2011, 2013, and 2015), and every even-number year a smaller-scale workshop has been held (2012, 2014, 2016). Working with the local hosts, Dr. Xin has been responsible for organizing and coordinating the symposia and workshops. He served as the co-chair of the 2011, 2013, 2015 and 2017 symposium.
- Since the late 90's Dr. Xin has been collaborating with Professor Daniel Berckmans at the Catholic University of Leuven (KUL), Belgium in quantification and modeling of physiological, energetic and behavioral responses of animals to biophysical factors, and recently on precision livestock farming (PLF). Students and faculty exchanges between ISU and KUL have taken place; and special symposia have been held. During the period 2011-2015, Dr. Xin served as a foreign advisor on the EU-PLF Project (€6 million) led by Professor Berckmans.
- From 2000 to 2013, Dr. Xin collaborated with Professor Christopher Wathes of the United Kingdom, first at Silsoe Research Institute (prior to 2006) and later at the Royal Veterinary College of University of London (2006-2013), in the areas of physiological and behavioral responses of animals to multiple thermal and gaseous stressors. One of Dr. Xin's former PhD students (Angela Green who is now on faculty at University of Illinois Urbana-Champaign) spent six months (Jan–June 2005) at SRI conducting animal welfare research. Reciprocal visits by Drs. Wathes and Xin were made and joint technical publications produced. Professor Wathes retired in 2013, and sadly passed away in 2016.
- During the period of 2006-2010 Dr. Xin was the U.S. member of an international research team (14 institutions), funded by the French Environment and Energy Agency (Dr. Paul Robin, France, Project Director), to develop international reference methods for measuring air emissions from livestock and poultry production systems. The reference methods have been disseminated to researchers and professionals worldwide for determining air emissions from animal production systems, so that the results are more comparable from country to country.
- Dr. Xin has conducted collaborative research with the National Institute of Animal Industry of Japan (Dr. Atsuo Ikeguchi, now professor at Utsunomiya University) in indoor air quality and welfare of poultry and swine as affected by biophysical factors. Reciprocal visits by Drs. Ikeguchi (6 months) and Xin (1 month) were conducted and journal articles have been published. At the recommendation of Dr. Ikeguchi and Dr. Tanaka (Dr. Xin's former post-doc, now Chief Researcher at NARO, Japan), Dr. Yoshiyuki Abe, Senior Researcher at National Agriculture and Food Research Organization (NARO, Japan) – Institute of Livestock and Grassland Science conducted research in Dr. Xin's lab (Nov 2013 – Nov 2014).

International Reputation and Honors

- Since 1994 Dr. Xin has delivered more than 60 invited talks at international conferences or symposia in Belgium, Brazil (multiple), Canada (multiple), China (multiple), Columbia, Costa Rica (multiple), Denmark, France (multiple), Germany, Italy, Japan (multiple), Mexico (multiple), Spain, The Netherlands (multiple), United Kingdom (multiple), and USA (multiple).
- Dr. Xin has hosted/mentored international visiting scientists/scholars/delegates from Africa, Australia, Belgium, Botswana, Brazil, Canada, China, Denmark, Germany, Greece, Japan, Korea, Morocco, Russia, The Netherlands, Turkey, United Kingdom, and Vietnam.
- Invited member of the Assessment Committee for a Precision Livestock Farming (PLF) faculty search at the Catholic University of Leuven, Belgium, appointed by the KU Leuven Academic Board (2016)
- Appointed as a founding member of the Global Expert Group on Avian Influenza, International Egg Commission (2015–)
- Appointed as a founding member of the Global Roundtable for Sustainable Egg Production, International Egg Commission (2015–)
- Invited to serve on the Scientific Advisory Committee for the Science and Information Centre for Sustainable Poultry Industry [Wissenschafts-und Informationszentrum Nachhaltige Geflügelwirtschaft (WING)], Raum, Germany (2013–present)
- Appointed to Overseas Co-chair of the Board of Directors for the International Research Center for Animal Environment and Welfare headquartered at the Chongqing Academy of Animal Sciences, Rongchang, Chongqing, China (2012–2016; 2016-2020)
- Appointed to the Scientific Advisory Committee for the Key Laboratory of Energy Conservation and Waste Management of Agricultural Structures, Ministry of Agriculture, China (2012–2017)
- Appointed to the Scientific Advisory Committee of the State Key Laboratory in Animal Nutrition (SKLAN), the Chinese Academy of Agricultural Sciences, Beijing, China (2011–2015)
- Appointed to the Scientific Advisory Committee for the Key Laboratory on Agricultural Structures and Environment at China Agricultural University, Beijing, China (2008–2011; 2011–2016)
- Invited Member of the Foreign Scientific Advisory Committee on an European Precision Livestock Farming Project (2013–2016, €5,000,000)
- External examiner of PhD dissertations and defense for University of Kwazulu-Natal, South Africa (Sept 2009), Katholic University of Leuven (KUL), Belgium (Sept 2015); and Wageningen University, The Netherlands (Oct 2016)
- Co-chair of the 2017 International Symposium on Animal Environment and Welfare (ISAE2017) sponsored by the International Research Center for Animal Environment and Welfare (IRCAEW), Oct 23-26, 2017; Chongqing, China
- Co-chair of ISAE2015 sponsored by IRCAEW, Oct 23-25, 2015; Chongqing, China
- Co-chair of ISAE2013 sponsored by IRCAEW, Oct 20-22, 2013; Chongqing, China
- Co-chair of ISAE2011 sponsored by IRCAEW, Oct 22-24, 2011; Chongqing, China
- Keynote presentation on “Modeling of ventilation shutdown in layer houses” at the International Egg Commission 2015 Global Leadership Conference, 20-24 September, 2015, Berlin, Germany.
- Keynote presentation on “*Environmental control for poultry production*” at 16th China National Poultry Science Symposium, May 13-15, 2013; Yangzhou, China
- Keynote presentation on “*State and R&D opportunities of U.S. egg industry and the role of Egg Industry Center*” at the Joint Conference of Chinese Association of Animal Science and Veterinary Medicine and Chinese Society of Agricultural Engineers on Eco-environment and Sustainable Livestock Production, Nov 2-5, 2012, Beijing, China
- Keynote speaker on “*Environmental footprint of the egg – dramatic progress over the past 50 years*” at the 2012 International Egg Commission Annual Conference held in London, UK, Sept 10-13, 2012.
- Keynote speaker on “*Trend and R&D Opportunities of Laying-Hen Housing Systems*” at the XXIV World’s Poultry Congress, August 5-9, 2012, Salvador, Brazil

- Keynote speaker on “*Toward standardization of data collection, analysis and presentation of AFO air emissions*” at the Ninth International Livestock Environment Symposium, July 9-12, 2012, Valencia, Spain
- Member of Planning Committee for the Ninth International Livestock and Environment Symposium (ILES IX), July 8-12, 2012, Valencia, Spain
- Keynote speaker on “*Toward sustainable development of egg industry and the role of Egg Industry Center*” at the International Symposium on Egg Industry, June 18-19, 2012, Beijing, China
- Member of the Organizing Committee for the World Poultry Congress XXV, September 5-9, 2016, Beijing, China
- Keynote speaker on “*A balance approach to animal welfare issues to avoid unintended consequences*” at the International Symposium on Health Environment and Animal Welfare co-sponsored by CIGR and China Agricultural University, October 20-22, 2011, Chongqing, China
- Invited to “Mission 2050 Think Tank, Net Zero: *Emissions, Water & Energy*” Forum sponsored by the Ontario Ministry of Agriculture, Food and Rural Affairs and the University of Guelph (2009)
- Member of Organizing Committee and Proceedings Co-chair of the CIGR-Section II Working Group Symposium “*Animal Housing in Hot Climates*”, Oct 22-25, 2009, Chongqing, China
- Program Chair of the Eighth International Livestock and Environment Symposium (ILES VIII), Sept 1-4, 2008, Iguassu Falls, Brazil
- Guest Professor, Zhejiang University (2010–present)
- Adjunct Professor of China Agricultural University (2008–present)
- Co-chair of Local Host Committee for the Seventh International Livestock and Environment Symposium (ILES VII), May 18-21, 2005, Beijing, China
- Honorary Scientist of the Rural Development Administration of the Republic of Korea (2004–2006)
- Honorary Professor of the Chinese Academy of Agricultural Sciences, Beijing China (1998–present)
- Honorary Professor of China Agricultural University (1996–present)
- Research Award for Foreign Expert, Ministry of Agriculture, Forestry and Fisheries, Japan (2000)

OTHER SIGNIFICANT CONTRIBUTIONS

Courses Taught or Guest-lectured (*Dr. Xin has no official teaching appointment*)

- AnSci 501 – *Graduate Seminar* (guest lectures on U.S. egg industry, 2010-2015)
- AnSci 233 – *Poultry Production* (guest lectures on poultry production systems, spring & fall 2016)
- AE/TSM 601 – *Seminar* (co-taught with Dr. Ramesh Kanwar), fall 2007, fall 2008
- AE572 – *Design of Environmental Systems for Ag Structures* (taught half), spring 1999
- AE214 – *Environmental Engineering for Grain and Animal Systems* (guest lectures)
- AST474/TSM 327 – *Livestock Housing Systems* (guest lectures on Poultry Production Systems, every fall semester since 2009)
- AE409 – *Engineering Quantification of Biological Processes* (guest lectures)
- SusAg515 – *Integrated Crop and Livestock Production Systems* (guest lecture – fall 2015)
- Engineering Honors Students Workshops (summer 2001)
- Mentoring of PIPELINE programs honor students (summer 2001)

Research and Instruction Laboratories Developed/Improved

- Livestock Environment and Animal Physiology Research Laboratory I (LEAP I) (1994)
- Livestock Environment and Animal Physiology Research Laboratory II (LEAP II) (2000)
- Bio-imaging and Measurement Laboratory (2000)
- Four mobile laboratories for measurement of air emissions from animal feeding operations (2005–2011)
- Layer Housing and Behavior Research Laboratory (2015)