

Hongwei Xin, Ph.D.

Assistant Dean for Research, College of Agriculture and Life Sciences

Charles F. Curtiss Distinguished Professor

Iowa Egg Council Endowed Professor, Director of Egg Industry Center

Departments of Agricultural and Biosystems Engineering (ABE) 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=102uQPAAAAAJ&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 |
| 2014.05–present | Charles F. Curtiss Distinguished Professor, ISU |
| 2013.10–present | Iowa Egg Council Endowed Professor |
| 2011.09–2013.07 | <i>Associate Chair for Research</i> of Agricultural and Biosystems Engineering, ISU |
| 2008.08–present | <i>Director</i> , Egg Industry Center located at ISU |
| 2002.07–present | <i>Professor</i> , Department of Agricultural and Biosystems Engineering, ISU |
| 2002.07–present | <i>Professor</i> , courtesy appointment of Department of Animal Science, ISU |
| 1998.07–2002.06 | <i>Associate Professor</i> , Department of Agricultural and Biosystems Engineering, ISU |
| 1993.12–1998.06 | <i>Assistant Professor</i> , Department of Agricultural and Biosystems Engineering, ISU |
| 1990.06–1993.11 | <i>Post-doctoral Research Associate</i> , Department of Biological and Agricultural Engineering, University of Arkansas, Fayetteville, Arkansas |
| 1990.01–1990.05 | <i>Post-doctoral Research Associate</i> , Department 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, Department of Agricultural Engineering, Shenyang Agr 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. He assists with evaluation of limited grant submissions and participates and leads certain topics at the Center Director meetings. As director of the Egg Industry Center, Dr. Xin oversees the operation of the center which 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)
- Member of Scientific Panel for World Wild Life research on Canadian Egg Sustainability (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 (11)
 - Seven Superior Paper Awards (1997[2], 2000, 2005[2], 2015, 2017) (top 2.5% of 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 (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 or 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. Soupir, 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.
2. 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* (accepted for publication)

3. 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>
4. Liu*, K. and **H. Xin**. 2017. Effects of horizontal distance between perches on perching behavior of Lohmann hens. *Applied Animal Behavioral Science* (accepted for publication)
5. Liu*, K. **H. Xin**, and P. Settari. 2017. Effects of a commercial LED light versus a typical CFL light on growing performance and activity levels of W-36 pullets. *Animal* (accepted for publication)
6. 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
7. 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
8. 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)
9. 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
10. **Xin, H.** and K. Liu. 2017. Precision livestock farming in egg production. *Animal Frontier* 7(1): 24-31.
11. 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
12. 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
13. 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
14. 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
15. 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
16. 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
17. 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
18. 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**)
19. 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

20. 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
21. 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.
22. 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.
23. 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.
24. 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
25. 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.
26. 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.
27. 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).
28. 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.
29. 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.
30. 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.
31. 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.
32. 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)
33. 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**).
34. 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.
35. 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.
36. 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.

37. 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.
38. 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.
39. Zhao*, Y, **H. Xin**, D. Zhao, W. Zheng, W. Tian, H. Ma, K. Liu, H. Hu, T. Wang, M.L. Soupir. 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.
40. Zheng*, W., Y. Zhao, **H. Xin**, B. Li, R.S. Gates, Y. Zhang and M.L. Soupir. 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.
41. 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.
42. 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.
43. 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.
44. 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.
45. 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.
46. 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.
47. Zhao*, Y., **H. Xin**, and B. Dong. 2013. Use of infrared thermography to assess laying-hen feather coverage. *Poultry Science* 92(2):295-302.
48. 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.
49. 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.
50. 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.
51. 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.
52. 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.

53. 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.
54. 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.
55. 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.
56. 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 Poul. Sci.* 52(6):800-806.
57. Walker, L., T. Wang, **H. Xin**, and D. Dolde. 2012. Supplementation of laying-hen feed with palm tocots and algal astaxanthin for egg yolknutrient enrichment. *J. Agric. Food Chem.* 60:1989-1999.
58. 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.
59. 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.
60. Chepete*, J.H., **H. Xin**, and H. Li. 2011. Ammonia emissions of laying hen manure as affected by accumulation time. *J. Poul. Sci.*, 48:138-143.
61. 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.
62. Dong, H., Z. Zhu, Z. Zhou, **H. Xin**, and Y. Chen. 2011. Greenhouse gas emissions from swine manure stored at different stack heights. *Animal Feed Science and Technology* 166-167:557-561
63. Huang, Y., Dong, H., B. Shang, and **H. Xin**, and Z. Zhu. 2011. Characterization of animal manure and cornstalk ashes as affected by incineration temperature. *Applied Energy* 88(3): 947-952. DOI: 10.1016/j.apenergy.2010.08.011
64. Jacobson, L.D., B.W. Auvermann, R. Massey, F.M. Mitloehner, A.L. Sutton, and **H. Xin** (co-authors in alphabetical order) 2011. Air Issues Associated with Animal Agriculture: A North American Perspective. IP47, The Council for Agricultural Science and Technology Issue paper. IP47, May 2011, 24 pp., <http://www.cast-science.org/displayProductDetails.asp?idProduct=172>
65. Li*, S., H. Li, **H. Xin**, and R.T. Burns. 2011. Particulate matter concentration and emissions of a high-rise layer house in Iowa. *Transactions of the ASABE* 54(3):1093-1101.
66. Li*, H., **H. Xin**, R. T. Burns, L. D. Jacobson, S. Noll, S. J. Hoff, J. D. Harmon, J. A. Koziel, I. Celen, and B. Hetchler. 2011. Air emissions from tom and hen turkey houses in the U.S. Midwest. *Transactions of the ASABE* 54(1): 305-314.
67. Muhlbauer R.V., T.A. Shepherd, H. Li, R.T. Burns, and **H. Xin**. 2011. Technical Note: Development and application of an induction-operated current switch for monitoring fan operation. *Applied Engineering in Agriculture* 27(2): 287-292.
68. Pang, Z, B. Li, **H. Xin**, L. Xi, W. Cao, C. Wang, and W. Li. 2011. Field evaluation of a water-cooled cover for cooling sows in hot and humid climates. *Biosystems Engineering* 110(2011):413-420
69. Tu*, X. S. Du, L. Tang, **H. Xin**, and B. Wood. 2011. A real-time automated system for monitoring individual feed intake and body weight of group housed turkeys. *Computer and Electronics in Agriculture* 75(2011): 313-320.

70. **Xin, H.**, R.S. Gates, A.R. Green, F.M. Mitloehner, P.A. Moore, Jr. and C.M. Wathes. 2011. Environmental impacts and sustainability of egg production systems. *Poultry Science* 90(1):263-277. doi:10.3382/ps.2010-00877
71. Zhu, Z., H. Dong, Z. Zhou, **H. Xin**, and Y. Chen. 2011. Ammonia and greenhouse gases concentrations and emissions of a naturally-ventilated laying hen house in Northeast China. *Transactions of the ASABE* 54(3):1085-1091.
72. Gu, Z., **H. Xin**, C. Wang, Z. Shi, W. Cao, and B. Li. 2010. Characterization of two types of covered creep boxes for gaseous concentrations, piglet usage and piglet performance. *Applied Engineering in Agriculture* 26(6): 1043-1049.
73. Gu, Z., **H. Xin**, C. Wang, Z. Shi, Z. Liu, F. Yang, B. Lin, C. Wang, B. Li. 2010. Effects of neoprene mat on diarrhea, mortality and foreleg abrasion of pre-weaning piglets. *Preventive Veterinary Medicine* 95 (2010): 16-22.
74. Li*, H. and **H. Xin**. 2010. Lab-scale assessment of gaseous emissions from laying-hen manure storage as affected by physical and environmental factors. *Transactions of the ASAE* 53(2): 593-604.
75. Pang, Z., B. Li, **H. Xin**, X. Yuan, and C. Wang. 2010. Characterization of an experimental water-cooled cover for sows. *Biosystems Engineering* 105(2010): 439-447.
76. Trabue, S.L., K.D. Scoggin, H. Li, R.T. Burns, **H. Xin**, and J.L. Hatfield. 2010. Speciation of volatile organic compounds from poultry production. *Atmospheric Environment* 44(2010):3538-3546.
77. Dong, H., G. Kang, Z. Zhu, X. Tao, Y. Chen, **H. Xin**, and J.D. Harmon. 2009. Ammonia and greenhouse gas concentrations and emissions of a hoop-structure grower-finisher swine barn. *Transactions of the ASABE* 52(5): 1741-1747.
78. Gates, R.S., K.D. Casey, **H. Xin**, and R.T. Burns. 2009. Building emissions uncertainty estimates. *Transactions of the ASABE* 52(4): 1345-1351.
79. Green*, A.R., I. Wesley, D. W. Trampel, and **H. Xin**. 2009. Air quality and hen health status in three types of commercial laying hen houses. *J. App. Poult. Res.* 18(3): 605-621.
80. Green, A.R. and **H. Xin**. 2009. Effects of stocking density and group size on heat and moisture production of laying hens under thermoneutral and heat challenging conditions. *Transactions of the ASABE* 52(6): 2027-2032.
81. Green*, A.R. and **H. Xin**. 2009. Effects of stocking density and group size on thermoregulatory responses of laying hens under heat challenging conditions. *Transactions of the ASABE* 52(6): 2033-2038.
82. Li*, H., **H. Xin**, S. Li, and R.T. Burns. 2009. Technical Notes: Upstream vs. downstream placement of FANS to determine fan performance *in situ*. *Transactions of the ASABE* 52(6): 2087-2090.
83. Liang*, Y., G.T. Tabler, S.E. Watkins, **H. Xin** and I.L. Berry. 2009. Energy use analysis of open-curtain vs. totally enclosed broiler houses in northwest Arkansas. *Applied Engineering in Agriculture* 25(4): 577-584.
84. **Xin, H.**, H. Li., Burns, R.S. Gates, D.G. Overhults, and J.W. Earnest. 2009. Use of CO₂ concentration or CO₂ balance to assess ventilation rate of commercial broiler houses. *Transactions of the ASABE* 52(4): 1353-1361.
85. Casey, K.D., R.S. Gates, E.F. Wheeler, **H. Xin**, Y. Liang, A.J. Pescatore, and M.J. Ford. 2008. On-farm fan performance: implications for ventilation and operating cost. *J. App. Poult. Res.* 17: (2): 283-295.
86. Cui, X., B. Li, Z. Shi, **H. Xin**, and W. Cao. 2008. Physicochemical properties and bactericidal efficiency of neutral and acidic electrolyzed water under different storage conditions. *Journal of Food Engineering* 91:582-586.

87. Davis*, J.D., **H. Xin**, R.D. MacDonald. 2008. Infrared thermography evaluation of commercially available incandescent heat lamps. *Applied Engineering in Agriculture* 24(5): 685-693.
88. Gates, R.S. and **H. Xin**. 2008. Extracting poultry behavior from time-series weigh scale records. *Computers and Electronics in Agriculture* 62(1): 8-14.
89. Gates, R. S., K.D. Casey, E.F. Wheeler, **H. Xin** and A.J. Pescatore. 2008. U.S. broiler ammonia emissions inventory model. *Atmospheric Environment* 42(14): 3342-3350.
90. Green*, A.R., C.W. Wathes, T.G.M. Demmers, J.M., Clark, and **H. Xin**. 2008. Development and application of a novel environmental preference test system for assessing responses of laboratory mice to atmospheric ammonia. *J. American Association for Laboratory Animal Science* 47(2):49-56.
91. Li*, H., **H. Xin**, R.T. Burns, Y. Liang. 2008. Reduction of ammonia emission from stored poultry manure using additives: Zeolite, Al⁺Clear, Ferix-3 and PLT. *J. App. Poult. Res.* 17(4): 421-431.
92. Lo, Y. M., J.A. Koziel, L. Cai, S.J. Hoff, W.S. Jenks, and **H. Xin**. 2008. Simultaneous chemical and sensory characterization of volatile organic compounds and semi-volatile organic compounds emitted from swine manure using Solid Phase Microextraction and Multidimensional Gas Chromatography–Mass Spectrometry–Olfactometry. *J Environ Qual* 37: 521-534.
93. Moody, L., H. Li, R.T. Burns, **H. Xin**, and R.S. Gates, S.J. Hoff, and D.G. Overhults. 2008. Broiler gaseous and particulate matter emission monitoring quality assurance project plan. *A Special Pub of ASABE*: http://asae.frymulti.com/aqap_handbook.asp?confid=aqap2008 (289 pages)
94. Shao*, B. and **Xin, H.** 2008. A real-time computer vision assessment and control of thermal comfort of group-housed pigs. *Computers and Electronics in Agriculture* 62(1): 15-21.
95. Trabue, S.L, K.D. Scoggin, F. Mitloehner, H. Li, R.T. Burns, and **H. Xin**. 2008. Field sampling method for quantifying volatile sulfur compounds emitted from animal feeding operations. *Atmospheric Environment* 42 (2008): 3332–3341.
96. Trabue, S.L., K. D. Scoggin, R.T. Burns, and **H. Xin**, and H. Li. 2008. Field sampling method for quantifying odorants in humid environments. *Environmental Science and Technology* 42(10): 3745-3750.
97. Topper, P.A., E.F. Wheeler, J.S. Zajaczkowski, R.S. Gates, **H. Xin**, Y. Liang, K.D. Casey. 2008. Ammonia emissions from two empty broiler houses with built-up Litter. *Transactions of the ASAE* 51(1): 219-225 (**Honorable Mention Award**)
98. Cai, L., J. A. Koziel, Y. Liang, and **H. Xin**. 2007. Evaluation of zeolite for control of odorants emissions from simulated poultry manure storage. *Journal of Environ. Quality* 36(1):184-193.
99. Dong, H., Z. Zhu, and **H. Xin**. 2007. Emissions of greenhouse gases from a typical Chinese swine farrowing house. *Transactions of the ASAE* 50(3): 1037-1044.
100. Dong, H., Z. Zhu, and **H. Xin**. 2007. Greenhouse gas emissions form swine buildings of various production stages in suburban Beijing, China. *Atmospheric Environment* 41: 2391-2399.
101. Roberts, S.A., **H. Xin**, B. J. Kerr, J. R. Russell, and K. Bregendahl. 2007. Effects of dietary fiber and low crude protein on nitrogen balance and egg production in laying hens. *Poultry Science* 86:1625-1632.
102. Roberts, S.A., **H. Xin**, B. J. Kerr, J. R. Russell, and K. Bregendahl. 2007. Effects of dietary fiber and low crude protein on ammonia emission from laying-hen manure. *Poultry Science* 86:1716-1725.
103. Zhu*, Z., **H. Xin**, H. Li, R.T. Burns and H. Dong. 2007. Assessment of in-line filter type and condition on ammonia measurement, *Transactions of the ASAE* 50(5): 1823-1830
104. Cai, L., J. A. Koziel, J. D. Davis, and **H. Xin**. 2006. Characterization of volatile organic compounds and odors by in vivo sampling of beef cattle rumen gas using solid phase microextraction and gas chromatography-mass spectrometry-olfactometry. *Journal of Analytical and Bioanalytical Chemistry* 386: 1791-1802.
105. Cook*, R.N., **H. Xin**, and D. Nettleton. 2006. Effects of cage stocking density on feeding behaviors of group-housed laying hens. *Transactions of the ASAE* 49(1): 187-192.

106. Liang*, Y., **H. Xin**, H. Li, R.S. Gates, E.F. Wheeler and K.D. Casey. 2006. Effect of measurement interval on estimation of ammonia emission rates for layer houses. *Transactions of the ASAE* 49(1): 183-186.
107. Panetta, D.M., W. J. Powers, **H. Xin**, B. J. Kerr, and K. J. Stalder. 2006. Nitrogen excretion and ammonia emissions from pigs fed modified diets. *Journal of Environmental Quality* 35 (4):1297-1308.
108. Tao, X., Z. Zhang, H. Dong, and **H. Xin**. 2006. Responses of thyroid hormones of market-size broilers at thermoneutral constant and warm cyclic temperatures. *Poultry Science* 85:1520-1528.
109. Wheeler, E.F., K.D. Casey, R.S. Gates, **H. Xin**, J.L. Zajaczkowski, P.A. Topper, Y. Liang, A. J. Pescatore. 2006. Ammonia emissions from twelve U.S.A. broiler chicken houses. *Transactions of the ASAE* 49(5): 1495-1512.
110. Gates, R. S., **H. Xin**, K. D. Casey, Y. Liang, and E.F. Wheeler. 2005. A method for measuring ammonia emissions from poultry houses. *Applied Poultry Res.* 14: 622-634.
111. Li*, H., H. Xin, Y. Liang, R. S. Gates, E. F. Wheeler, and A.J. Heber. 2005. Comparison of direct vs. indirect ventilation rate determinations in layer barns using manure belts. *Transactions of the ASAE* 48(1): 367-372.
112. Liang*, Y., **H. Xin**, E. F. Wheeler, R. S. Gates, J. S. Zajaczkowski, P. Topper, H. Li and K. D. Casey. 2005. Ammonia emissions from U.S. laying hen houses in Iowa and Pennsylvania. *Transactions of the ASAE* 48(5): 1927-1941.
113. Zhang, Q. and **H. Xin**. 2005. Resting behavior of piglets in farrowing crates equipped with heat mats. *Applied Engineering in Agriculture* 21(6): 1067-1071.
114. Brown-Brandl, T.M., J. A. Nienaber, **H. Xin**, and R.S. Gates. 2004. A literature review of swine heat and moisture production. *Transactions of the ASAE* 47(1): 259-270. (**Superior Paper Award**)
115. Chepete*, H. J. and **H. Xin**. 2004. Heat and moisture production of poultry and their housing systems: *Molting layers*. *Transactions of the ASHRAE* 110(2): 274-285.
116. Chepete*, H. J., **H. Xin**, M.C. Puma, and R.S. Gates. 2004. Heat and moisture production of poultry and their housing systems: *Pullets and layers*. *Transactions of the ASHRAE* 110(2): 286-299.
117. Chepete*, H. J. and **H. Xin**. 2004. Ventilation rates of laying hen houses based on new vs. old heat moisture production data. *Applied Engineering in Agriculture* 20(6): 835-842.
118. Dong, H. X. Tao, **H. Xin**, and Q. He. 2004. Enteric methane emissions in China estimated with different IPCC methods and production schemes. *Transactions of the ASAE* 47(6): 2051-2057.
119. Gates, R. S., K. D. Casey, **H. Xin**, E. F. Wheeler, and J. D. Simmons. 2004. Fan assessment numeration system (FANS) design and calibration specifications. *Transactions of the ASAE* 47(5): 1709-1715.
120. Liang*, Y., **H. Xin**, S. J. Hoff, and T. L. Richard. 2004. Performance of Single Point Monitor in measuring ammonia and hydrogen sulfide gases. *Applied Engineering in Agriculture* 20(6): 863-872.
121. Persyn*, K.E., **H. Xin**, D. Nettleton, A. Ikeguchi, and R.S. Gates. 2004. Feeding behaviors of laying hens with or without beak-trimming. *Transactions of the ASAE* 47(2): 591-596 (**Superior Paper Award**)
122. Pedersen, S., G. J. Monteny, **H. Xin** and H. Takai. 2004. Progress in research into ammonia and greenhouse gas emissions from animal production facilities. CIGR E-Journal Vol 6. <http://cigr-ejournal.tamu.edu/Volume6.html>.
123. Brown-Brandl, T.M., T. Yanagi, Jr., **H. Xin**, R.S. Gates, R. Bucklin, and G. Ross. 2003. A new telemetry system for measuring core body temperature in livestock and poultry. *Applied Engineering in Agriculture* 19(5): 583-589.

124. Tao*, X. and **H. Xin**. 2003. Surface wetting and its optimization to cool broiler chickens. *Transactions of the ASAE* 46(2): 483-490.
125. Tao*, X. and **H. Xin**. 2003. Acute, synergistic effects of air temperature, humidity and velocity on homeostasis of market-size broilers. *Transactions of the ASAE* 46(2): 491-497.
126. Chepete*, H. J. and **H. Xin**. 2002. Heat and moisture production of poultry and their housing systems: *Literature review*. *Transactions of the ASHRAE* 108(2): 448-466.
127. Chinkuyu, A.J., R.S. Kanwar, J.C. Lorimor, **H. Xin**, and T.B. Bailey. 2002. Effects of laying hen manure application rate on water quality. *Transactions of the ASAE* 45(2): 299-308
128. Tabler, G. T., I. L. Berry, and **H. Xin**, and T. L. Barton. 2002. Spatial distribution of mortality in broiler flocks. *Applied Poultry Res.* 11: 388-396.
129. **Xin, H.**, Puma, M.C., R.S. Gates, and D. U. Ahn. 2002. Effects of drinking water temperature on laying hens subjected to warm cyclic environments. *Poultry Science* 81:608-617.
130. Yanagi*, Jr., T., **H. Xin**, and R. S. Gates. 2002. A research facility for studying poultry responses to heat stress and its relief. *Applied Engineering in Agriculture* 18(2): 255-260.
131. Yanagi*, Jr., T., **H. Xin**, and R. S. Gates. 2002. Optimization of partial surface wetting to cool caged laying hens. *Transactions of the ASAE* 45(4): 1091-1100 (**Honorable Mention Paper Award**).
132. Dong, H. X. Tao, J. Lin, Y. Li, and **H. Xin**. 2001. Comparative evaluation of cooling systems for farrowing sows. *Applied Engineering in Agriculture* 17(1): 91-96.
133. Ikeguchi*, A. and **H. Xin**. 2001. Field evaluation of a sprinkling system for cooling commercial laying hens in Iowa. *Applied Engineering in Agriculture* 17(2): 217-221.
134. Puma*, M.C., **H. Xin**, R.S. Gates, and D.J. Burnham. 2001. An instrumentation system for measuring feeding and drinking behavior of poultry. *Applied Engineering in Agriculture* 17(3): 365-374.
135. Zhang*, Q. and **H. Xin**. 2001. Responses of piglets to creep heat type and location in farrowing crate. *Applied Engineering in Agriculture* 17(4): 515-519 (**Honorable Mention Paper Award**).
136. **Xin, H.**, I. L. Berry, G. T. Tabler, and T. A. Costello. 2001. Heat and moisture production of poultry and their housing system: *Broilers*. *Transactions of the ASAE* 44(6): 1853-1859.
137. Chepete*, H.J. and **H. Xin**. 2000. Alleviating heat stress of laying hens by intermittent partial surface cooling. *Transactions of the ASAE* 43(4): 965-971.
138. Han*, T. and **H. Xin**. 2000. Effects of intermittent lighting on limited-fed neonatal chicks. *Transactions of the ASAE* 43(6): 1767-1770.
139. Hu*, J. and **H. Xin**. 2000. Image-processing algorithms for swine postural behavior analysis. *Behavior Research Methods, Instruments & Computers* 32(1): 72-85.
140. Ibarra, J. G., Y. Tao, and **H. Xin**. 2000. Combined IR imaging – neural network for the estimate of internal temperature in cooked chicken meat. *Optical Engineering* 39(11): 3032-3048.
141. **Xin, H.**, Q. Zhang, M. Puma, J.D. Harmon, D.H. Harris, and M.L. Gramer. 2000. Effects of fluctuating temperatures on isowean pigs. *Transactions of the ASAE* 43(2): 433-438.
142. Yang*, P., J.C. Lorimor, and **H. Xin**. 2000. Nitrogen loss from laying hen manure in high-rise layer houses. *Transactions of the ASAE* 43(6): 1771-1780 (**Honorable Mention Paper Award**).
143. Ye*, W. and **H. Xin**. 2000. Measurement of surface temperature and postural responses of group-housed pigs to thermal conditions by thermography. *Transactions of the ASAE* 43(6): 1843-1851.
144. Zhang*, Q. and **H. Xin**. 2000. Static and dynamic temperature distribution of heat mats for swine farrowing creep heating. *Applied Engineering in Agriculture* 16(5): 563-569.
145. Zhang*, Q. and **H. Xin**. 2000. Modeling of heat mat operation for piglet creep heating. *Transactions of the ASAE* 43(5): 1261-1267.
146. Lorimor, J.C. and H. Xin. 1999. Manure production and nutrient concentrations from high-rise layer houses. *Applied Engineering in Agriculture* 15(4): 337-340.

147. **Xin, H.** 1999. Assessing swine thermal comfort by image analysis of postural behaviors. *J. Anim. Sci.* 77, Suppl. 2:1-9 (**Invited article**).
148. **Xin, H.** and Q. Zhang. 1999. Preference of heat lamp or heat mat by neonatal pigs at cool and warm ambient temperatures with low to high drafts. *Applied Engineering in Agriculture* 15(5): 547-551.
149. **Xin, H.**, J.D. Harmon, H. Dong, D.H. Harris, H.J. Chepete, R.C. Ewan, and M.L. Gramer. 1999. Effects of post-weaning nutritional conditions on SEW pigs. *Transactions of the ASAE* 42 (5): 1463-1473.
150. Zhou*, H. and **H. Xin**. 1999. Effects of heat lamp output and color on piglets at cool and warm environments. *Applied Engineering in Agriculture* 15(4): 327-330 (**Superior Paper Award**).
151. **Xin, H.**, H.J. Chepete, J. Shao, and J.L. Sell. 1998. Heat and moisture production and minimum ventilation requirements of tom turkeys during brooding-growing period. *Transactions of the ASAE* 41(5): 1489-1498.
152. Shao*, J., **H. Xin**, and J.D. Harmon. 1998. Comparison of image feature extraction for classification of swine thermal comfort behavior. *Computer and Electronics in Agriculture* 19: 223-232.
153. Harmon, J.D., **H. Xin**, and J. Shao. 1997. Energetics of segregated early weaned pigs. *Transactions of the ASAE* 40(6): 1693-1698.
154. Shao*, J., **H. Xin**, and J.D. Harmon. 1997. Neural network analysis of postural behavior of young swine to determine their thermal comfort state. *Transactions of the ASAE* 40(3): 755-760 (**Honorable Mention Paper Award**).
155. Tanaka*, A. and **H. Xin**. 1997. Energetics, mortality, and body mass change of breeder chicks subjected to different post-hatch feed dosages. *Transactions of the ASAE* 40(5): 1457-1461.
156. Tanaka*, A. and **H. Xin**. 1997. Thermal characteristics of a hoop structure for swine production. *Transactions of the ASAE* 40(4): 1171-1177.
157. Tanaka*, A. and **H. Xin**. 1997. Effects of structural and stacking configuration of containers for transporting chicks on their microenvironment. *Transactions of the ASAE* 40(3): 777-782.
158. **Xin, H.** and K. Lee. 1997. Physiological evaluation of chick morbidity during extended post-hatch holding. *J. App. Poult. Res.* 6(4): 417-421.
159. **Xin, H.** 1997. Mortality and body weight of neonatal breeder chicks as influenced by air temperature fluctuations. *Appl. Poultry Res.* 6: 199-204.
160. **Xin, H.**, H. Zhou, and D.S. Bundy. 1997. Comparison of energy use and piglet performance between the conventional and an energy-efficient heat lamp. *Applied Engineering in Agriculture* 13(1): 95-99.
161. **Xin, H.** and K. Lee. 1996. Use of Aqua-Jel® and feed for nutrient supply during long-journey air transport of baby chicks. *Transactions of the ASAE* 39(3): 1123-1126 (**Superior Paper Award**).
162. **Xin, H.**, I.L. Berry, and G.T. Tabler. 1996. Minimum ventilation requirement and associated energy cost for aerial ammonia control in broiler houses. *Transactions of the ASAE* 39(2): 645-648 (**Superior Paper Award**).
163. **Xin, H.** and J.D. Harmon. 1996. Responses of group-housed neonatal chicks to post-hatch holding environment. *Transactions of the ASAE* 39(6): 2249-2254.
164. **Xin, H.**, J.L. Sell, and D.U. Ahn. 1996. Effect of light and darkness on heat and moisture production of broilers. *Transactions of the ASAE* 39(6): 2255-2258.
165. Zhou*, H., **H. Xin**, and D.S. Bundy. 1996. Sampling rate for measurement of piglet thermoregulatory behavior. *Transactions of the ASAE* 39(6): 2259-2260.
166. **Xin, H.** and S.R. Rieger. 1995. Transport conditions and mortalities associated with remote international shipment of young chicks. *Transactions of the ASAE* 38(6): 1863-1867.

167. **Xin, H.**, I.L. Berry, G.T. Tabler, and T.L. Barton. 1994. Feed and water consumption, growth, and mortality of male broilers. *Poultry Sci.* 73: 610-616.
168. **Xin, H.**, I.L. Berry, T.L. Barton, and G.T. Tabler. 1994. Temperature and humidity profiles of broiler houses with experimental conventional and tunnel ventilation systems. *Applied Engineering in Agriculture* 10(4): 535-542.
169. **Xin, H.**, I.L. Berry and T.A. Costello. 1994. A computerized measurement and data acquisition system for field poultry research. *Computer and Electronics in Agriculture* 11: 143-156.
170. **Xin, H.**, I. L. Berry, T. L. Barton, and G. T. Tabler. 1993. Feeding and drinking patterns of broilers subjected to different feeding and lighting programs. *J. App. Poult. Res.* 2(4): 365-372.
171. **Xin, H.**, I. L. Berry, T. L. Barton, and G. T. Tabler. 1993. Sidewall effects on energy use in broiler houses. *J. App. Poult. Res.* 2: 176-183.
172. **Xin, H.**, J. A. DeShazer, and M. M. Beck. 1992. Energetic responses of pre-fasted growing turkeys to acute heat exposure. *Transactions of the ASAE* 35(1): 315-318.
173. **Xin, H.**, J. A. DeShazer, K. P. Rajurkar, and J. J. R. Feddes. 1992. Data dependent system analysis of stochastic swine energetic responses. *J. Thermal Biol.* 17 (4/5): 225-234.
174. **Xin, H.**, and J. A. DeShazer. 1992. Feeding patterns of growing pigs at warm constant and cyclic temperatures. *Transactions of the ASAE* 35(1): 319-323.
175. **Xin, H.**, and J. A. DeShazer. 1991. Swine responses to constant and modified diurnal cyclic temperatures. *Transactions of the ASAE* 34(6): 2533-2540.
176. **Xin, H.**, J. A. DeShazer, and D. W. Leger. 1989. Pig vocalizations under selected husbandry practices. *Transactions of the ASAE* 32(6): 2181-2184.
177. **Xin, H.**, J.A. DeShazer and M.M. Beck. 1987. Post-effect of ammonia on energetics of laying hens at high temperatures. *Transactions of the ASAE* 30(4): 1121-1125.
178. **Xin, H.**, J.A. DeShazer and M.M. Beck. 1987. Heat loss and respiration patterns of layers as influenced by aerial ammonia and high temperatures. *Transactions of the CSAE* 87(2): 98-103.

Manuscripts under Review

179. Abe, Y., T.M. Brown-Brandl, R.A. Eigenberg, and **H. Xin**. Use of fractal analysis with Higuchi's method to delineate feedlot heifer body temperature regulation. *J. Thermal Biology*
180. Chai*, L., Y. Zhao, H. Xin, T. Wang, and M.L. Soupier. Mitigating airborne bacterial emissions from litter of cage-free hen houses by spray of acidic electrolyzed water: A laboratory study. *Biosystems Engineering*
181. Davis*, J.D., **H. Xin**, J.D. Harmon, and D.H. Cook. Use of rumen temperature to characterize individual drinking activity in grouped beef cattle. *Transactions of the ASABE*
182. 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*
183. Lin, C., H. Li and **H. Xin**. Ammonia capturing characteristics of zeolite used for poultry air emission studies. *Applied Poultry Research*
184. Liu*, K. **H. Xin**, and L. Chai. Choice between LED and fluorescent lights by pullets and laying hens. *Transactions of the ASABE*
185. Roberts*, S.A., **H. Xin**, and K. Bregendahl. Effects of dietary corn distiller's dried grains with solubles on ammonia emission, manure nutrients, and egg production parameters for laying hens in high-rise houses. *Poultry Science*
186. Sadler, L.J., T.M. Widowski, C. Wang, A.K. Johnson, J.P. Stinn, **H. Xin**, M.A. Sutherland, and S.T. Millman. Distress elicited by carbon dioxide or argon gases during induction of anaesthesia for suckling piglets. *Applied Animal Behaviour Science*

Books and Book Chapters

187. Gates, R.S., **H. Xin**, B. Li and R. Zhao, editors. 2013. International Symposium on Animal Environment and Welfare. 19-22 October, 2013. Rongchang, Chongqing, China. 543 pp.
188. DeShazer, J.A., G. L. Hahn, and **H. Xin**. 2009. Chapter 1. Basic Principles of the Thermal Environment and Livestock Energetics. In ASABE Monograph "Livestock Energetics and Thermal Environmental Management" Ed. J.A. DeShazer, ISBN: 1-892769-74-3, St. Joseph, MI: ASABE, pp1-22.
189. Nienaber, J.A., J.A. DeShazer, **H. Xin**, P.E. Hillma, J.T. Yen, C.F. Ferrell. 2009. Chapter 4. Measuring Energetics of Biological Processes. In ASABE Monograph "Livestock Energetics and Thermal Environmental Management" Ed. J.A. DeShazer, ISBN: 1-892769-74-3, St. Joseph, MI: ASABE, pp73-112.
190. **Xin, H.** Indirect Animal Calorimetry. In: *Biomeasurement and Experimental Techniques for Avian Species* <http://web.uconn.edu/poultry/NE-127/NewFiles/calorimetry.html>
191. **Xin, H.** et al. Heating, Cooling and Ventilation. In: *Poultry Housing and equipment Handbook*, a publication of Natural Resources and Agricultural Engineering Service, Cornell University, Ithaca, NY (in review).
[Role: Chair of the multiple-author chapter committee - coordinating composition of the initial draft, writing sections of the chapter, editing and revising the chapter.]
192. 4th CIGR Report of Working Group on Climatization of Animal Houses – Heat and moisture production at animal and house levels. 2002. Eds. S. Pedersen and K. Silvik. www.agrsci.dk/jbt/spe/CIGRReport

Conference Proceedings (* indicates Dr. Xin was the mentor of the first author)

193. Lao*, F., T.M. Brown-Brandl, J.P. Stinn, G. Teng, K. Liu, S.M. Leonard, and **H. Xin**. 2016. Sow lying behaviors before, during and after farrowing. In Proc. of the First Asian Precision Livestock Farming (1st LF-Asia) Conference held at China Agricultural University, Sept 9-11, 2016, Beijing, China, eds. G. Zhang, C. Wang, W. Zheng, and D. Berckmans, pp177-179.
194. Liu*, K. L. Chai, and **H. Xin**. 2016. Preference of W-36 pullets between a commercial LED light and a typical CFL light. In Proc. of the First Asian Precision Livestock Farming (1st PLF-Asia) Conference held at China Agricultural University, Sept 9-11, 2016, Beijing, China, eds. G. Zhang, C. Wang, W. Zheng, and D. Berckmans, pp121-123.
195. Oliveira*, J., **H. Xin**, Y. Zhao, and K. Glaess. 2016. Feeding and nesting behaviors of laying hens in enriched colony housing. In Proc. of the First Asian Precision Livestock Farming (1st PLF-Asia) Conference held at China Agricultural University, Sept 9-11, 2016, Beijing, China, eds. G. Zhang, C. Wang, W. Zheng, and D. Berckmans, pp114-115.
196. Ma*, **H. Xin**, Y. Zhao, B. LI, T. A. Shepherd, I. Alvarez. 2105. Assessment of lighting needs by laying hens via preference test. In Proc. of International Symposium on Animal Environment and Welfare, Chongqing, China, 23-26 October, 2015, eds. J. Ni, T. Lim, and C. Wang, pp241-248.
197. **Xin, H.**, Y. Zhao, W. Verhoijssen, L. Li. 2015. An automated tracking and monitoring system for laying-hen behavioral research in an enriched colony system. In Proc. of International Symposium on Animal Environment and Welfare, Chongqing, China, 23-26 October, 2015, eds. J. Ni, T. Lim, and C. Wang, pp319-326.
198. Lao*, F. J.P. Stinn, **H. Xin**, T. Brown-Brandl, and K. Liu. 2015. Determination of piglet location in farrowing crates based on depth and digital images. In Proc. of the 7th European Conference on Precision Livestock Farming, Milan, Italy, 15-18 September, 2015, eds. M. Guarino and D. Berckmans, pp563-572.
199. Nakarmi*, A.D., L. Tang and **H. Xin**. 2013. Automatic quantification of laying-hen behaviors using a 3D vision camera and radio frequency identification technology. In Proc of the 6th

- European Conference on Precision Livestock Farming, Leuven, Belgium, 10-12 September 2013, eds. D. Berckmans and J. Vandermeulen, pp903-915.
200. Stinn*, J.P. and **H. Xin**. 2013. Heat and moisture production rates of a modern U.S. swine breeding-gestation-farrowing facility. In Proceedings of the International Symposium on Animal Environment and Welfare, Oct 20-22, 2013, Chongqing, China.
 201. **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, Chongqing, China.
 202. Chen*, Y. **H. Xin**, H. Li, T.A. Shepherd, M.D. Hayes, J.P. Stinn, R.T. Burns, R.S. Gates, and H. Dong. 2012. Comparison of using diurnal integration vs. daily mean concentration and ventilation rate to determine ammonia emissions from poultry houses. In *Proc of the 9th International Livestock Environment Symposium*, July 8-12, 2012, Valencia, Spain. St Joseph, MI: ASABE
 203. Hayes*, M.D., **H. Xin**, H. Li, T.A. Shepherd, Y. Chen, Y. Zhao, and J. P. Stinn. 2012. Bioenergetics of Hy-Line brown hens in aviary houses. In *Proc of the 9th International Livestock Environment Symposium*, July 8-12, 2012, Valencia, Spain. St Joseph, MI: ASABE
 204. Hayes*, M.D., **H. Xin**, H. Li, T.A. Shepherd, Y. Chen, Y. Zhao, and J. P. Stinn. 2012. Ammonia, greenhouse gas, and particulate matter concentrations and emissions of aviary layer houses in the Midwestern USA. In *Proc of the 9th International Livestock Environment Symposium*, July 8-12, 2012, Valencia, Spain. St Joseph, MI: ASABE
 205. Hayes*, M.D., **H. Xin**, H. Li, T.A. Shepherd, and J. P. Stinn. Electricity and fuel usage of aviary laying-hen houses in the Midwestern United States. In *Proc of the 9th International Livestock Environment Symposium*, July 8-12, 2012, Valencia, Spain. St Joseph, MI: ASABE
 206. Purswell, J.L., W.A. Dozier III, H.A. Olanrewaju, J.D. Davis, **H. Xin**, and R.S. Gates. 2012. Effect of temperature-humidity index on live performance and processing yields in broiler chickens grown from 49 to 63 days. In *Proc of the 9th International Livestock Environment Symposium*, July 8-12, 2012, Valencia, Spain. St Joseph, MI: ASABE
 207. Stinn*, J. P., **H. Xin**, T.A. Shepherd, and R.T. Burns. 2012. Ammonia and greenhouse gas concentrations and emissions of a swine breeding-gestation-farrowing facility in the Midwestern USA. In *Proc of the 9th International Livestock Environment Symposium*, July 8-12, 2012, Valencia, Spain. St Joseph, MI: ASABE
 208. Zhao*, Y., **H. Xin**, T.A. Shepherd, M.D. Hayes, and J. P. Stinn. 2012. Characterizing thermal environment, supplemental heat and ventilation needs of alternative laying-hen housing systems. In *Proc of the 9th International Livestock Environment Symposium*, July 8-12, 2012, Valencia, Spain. St Joseph, MI: ASABE
 209. Pepple, L.M., R.T. Burns, **H. Xin**, H. Li, and J.F. Patience. 2010. A comparison of gaseous emissions from swine finisher facilities fed traditional vs. a DDGS-based diet. In *Proc of International Symposium on Air Quality and Manure Management for Agriculture*, held in Dallas, TX. ASABE, St. Joseph, MI.
 210. Wheeler, E.F., P. H. Patterson, **H. Xin**, R.S. Gates, C. Gregory, A. Y. Pekel, H.K. Burley. 2010. Ammonia emission, manure nutrients and egg production of laying hens fed distiller dried grain diets. In *Proc of International Symposium on Air Quality and Manure Management for Agriculture* held in Dallas, TX. ASABE, St. Joseph, MI.
 211. **Xin, H.** 2009. Cooling poultry in tropical climates. Proc. of the Ensminger School International Conference held on February 11-13, 2009 in San Jose, Costa Rica.
 212. Amaral, M.F.P., R.S. Gates, D.G. Overhults, I.F.F. Tinôcol, H. Li, R.T. Burns, **H. Xin** and J.W. Earnest. 2008. Analysis of different methods to compute ammonia concentration and emission rate. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE,

213. Burns, R.T., H. Li, L. Moody, **H. Xin**, R. Gates, D. Overhults, J. Earnest. 2008. Quantification of particulate emissions from broiler houses in the southeastern United States. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
214. Carvalho, V.F., T. Yanagi Jr., **H. Xin**, R. S. Gates, F. Damasceno, S. R. P. Moraes. 2008. Mathematical model for thermal environment and broiler chickens performance prediction in acclimatized housing. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
215. Gates, R.S., K.D. Casey, **H. Xin**, R. Burns, H. Li. 2008. Uncertainty analysis in animal building aerial emissions measurements. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
216. Green*, A.R. and **H. Xin**. 2008. Effects of stocking density and group size on thermoregulatory response of laying hens under heat challenging conditions. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
217. Green*, A.R. and **H. Xin**. 2008. Effects of stocking density and group size on heat and moisture production of laying hens under thermoneutral and heat challenging conditions. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
218. Li*, H, **H. Xin**, R.T. Burns, S.A. Roberts, K. Bregendahl. 2008. Effects of dietary modification on laying hens in high-rise houses: Part I – Emissions of ammonia, hydrogen sulfide and carbon dioxide. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
219. Li*, H., **H. Xin**, R.T. Burns, S.J. Hoff, J.D. Harmon, L.D. Jacobson, S. Noll. 2008. Effects of bird activity, ventilation rate and humidity on pm10 concentration and emission rate of a turkey barn. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
220. Li*, H., **H. Xin**, R.T. Burns, S.J. Hoff, J.D. Harmon, L.D. Jacobson, S. Noll. 2008. effect of sampling interval on ammonia and particulate matter emissions from turkey grow-out barns. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
221. Roberts*, S.A., H. Li, **H. Xin**, R. T. Burns, and K. Bregendahl. 2008. Effects of dietary modifications on laying hens in high-rise houses: Part II – Hen production performance. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
222. Wheeler, E.F., K. D. Casey, R. S. Gates, **H. Xin**, P. A. Topper, Y. Liang. 2008. Ammonia emissions from usa broiler chicken barns managed with new bedding, built-up litter, or acid-treated litter. Proc of the 8th International Livestock Environment Symposium, Sept 1-3, 2008, Iguassu Falls, Brazil. (eds) R.R Stowell, E.F. Wheeler and H. Xin. St Joseph, MI: ASAE
223. Amaral, M.F.P., R.S. Gates, E.G. Wilkerson, D.G. Overhults, I.F.F. Tinôco1, H. Li, R.T. Burns, **H. Xin** and J.W. Earnest. 2007. Comparison between two systems for ammonia emission monitoring in broiler houses. In: Proc International Symposium on Air Quality and Waste Management for Agriculture, Sept 15-19, 2007; Broomfield, CO, USA
224. Burns, R.T., **H. Xin**, R.S. Gates, H. Li, D.G. Overhults, L. Moody, and J.W. Earnest. 2007. Ammonia emissions from broiler houses in the southeastern United States. In: Proc International Symposium on Air Quality and Waste Management for Agriculture, Sept 15-19, 2007; Broomfield, CO, USA
225. Burns, R.T., **H. Xin**, R.S. Gates, H. Li, L.B. Moody, D.G. Overhults, J. Earnest & S. Hoff. 2007. Continuous Monitoring Method for Ammonia Emissions from Poultry Broiler Houses in the

- United States. In: Proc. International Conference on Ammonia in Agriculture, March 19-21, 2007; Ede, The Netherlands.
226. **Xin, H.**, H. Li, Lang, Y. & R.T. Burns. 2007. Mitigation of Ammonia Emissions from Laying Hen Manure Storage by Physical and Chemical Means. In: Proc. International Conference on Ammonia in Agriculture, March 19-21, 2007; Ede, The Netherlands.
227. Burns, R.T., **H. Xin**, H. Li, S.J. Hoff, L. Moody, R.S. Gates, D.G. Overhults, J.W. Earnest. 2006. Monitoring system design for the Southeastern broiler gaseous and particulate matter air emissions project. In Proceedings of the Symposium on Air Quality Measurement Methods and Technology, May 9-11, 2006, Sheraton Imperial Hotel and Convention Center, Durham. NC. Paper # 042806, Air and Waste Management Association.
228. Burns, R.T., **H. Xin**, R. Gates, H. Li, S.J. Hoff, L.B. Moody, D. Overhults, and J. Earnest. 2006. Monitoring system design for the southeastern broiler gaseous and particulate matter air emissions monitoring project. In: Proc. Workshop on Agricultural Air Quality: State of the Science, June 5-8, 2006, Bolger Conference Center, Potomac, MD, (eds.) V.P. Aneja et al., Raleigh, NC 27695. ISBN 0-9669770-4-1. pp 615-620.
229. Cai, L. J.A. Koziel, Y. Liang, and **H. Xin**. 2006. Evaluation of zeolite for control of odorants emissions from simulated poultry manure storage. In: Proc. Workshop on Agricultural Air Quality: State of the Science, June 5-8, 2006, Bolger Conference Center, Potomac, MD, (eds.) V.P. Aneja et al., Raleigh, NC 27695. ISBN 0-9669770-4-1. pp 533-534.
230. Cai, L. J.A. Koziel, J.D. Davis, and **H. Xin**. 2006. Characterization of volatile organic compounds and odors by in vivo sampling of beef cattle rumen gas using solid phase microextraction and gas chromatography-mass spectrometry-olfactometry: Implications for gaseous emissions from livestock. In: Proc. Workshop on Agricultural Air Quality: State of the Science, June 5-8, 2006, Bolger Conference Center, Potomac, MD, (eds.) V.P. Aneja et al., Raleigh, NC 27695. ISBN 0-9669770-4-1. pp 824-825.
231. Casey, K.D., R.S. Gates, A.T. Pescatore, **H. Xin**, Y. Liang, and E.F. Wheeler. 2006. Comparison of measured annual ammonia emissions from poultry production facilities with mass balance approaches. In: Proc. Workshop on Agricultural Air Quality: State of the Science, June 5-8, 2006, Bolger Conference Center, Potomac, MD, (eds.) V.P. Aneja et al., Raleigh, NC 27695. ISBN 0-9669770-4-1. pp 542-545.
232. Casey, K.D., R.S. Gates, A. Singh, A.J. Pescatore, E.F. Wheeler, **H. Xin**, Y. Liang. 2006. Managing litter to reduce ammonia emissions from broiler chicken houses in the U.S.A. In: Proc. Poultry Information Exchange 2006, April 2-4, 2006; Surfers Paradise, Gold Coast, Australia. PIX Association Inc.
233. Casey, K.D., Gates, R.S., A. Singh, A. J. Pescatore, E.F. Wheeler, **H. Xin**, and Y. Liang. 2005. The effect of litter management on ammonia emissions from U.S. broiler chicken houses. Paper # 615, Air and Waste Management Association.
234. Li*, H., R.T. Burns, **H. Xin**, L.B. Moody, R. Gates, D. Overhults, and J. Earnest. 2006. Development of a continuous NH₃ emissions monitoring system for commercial broiler houses. In: Proc Annual Air & Waste Management Association Conference.
235. Moody, L. B., H. Li, R.T. Burns, **H. Xin**, and R. Gates. 2006. Quality Assurance Project Plan (QAPP) for monitoring gaseous and particulate matter emissions from Southeastern broiler houses. In: Proc. Workshop on Agricultural Air Quality: State of the Science, June 5-8, 2006, Bolger Conference Center, Potomac, MD, (eds.) V.P. Aneja et al., Raleigh, NC 27695. ISBN 0-9669770-4-1. pp 621-626.
236. Moody, L., H. Li, R.T. Burns, **H. Xin**, and R.S. Gates. 2006. Quality Assurance Project Plan (QAPP) for monitoring gaseous and particulate matter emissions from southeastern broiler houses. In Proc. Symposium on Air Quality Measurement Methods and Technology, May 9-11, 2006, Sheraton Imperial Hotel and Convention Center, Durham. NC. Paper # 042706, Air and Waste Management Association.

237. **Xin, H.** 2006. United Egg Producers Initiative on Air Emission Mitigation. In: Proc. The National Poultry Waste Management Symposium held in Springdale, AR, Oct. 24-25, 2006.
238. **Xin, H., H. Li, R.T. Burns.** 2006. Strategies to reduce air emissions in layer facilities. In: Proc. The National Poultry Waste Management Symposium held in Springdale, AR, Oct. 24-25, 2006.
239. Cook*, R. N. and **H. Xin.** 2005. Effects of cage stocking density on feeding behaviors of group-housed laying hens. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. (eds) T. Brown-Brandl and R. Maghirang. St Joseph, MI: ASAE, Pp 629-635. LCCN 2005924086. ASAE Pub #701P0205.
240. Cordeiro, M.B., I.F.F. Tinoco, R.B. Vigoderis, P.A.V. Oliveira, R.S. Gates, and **H. Xin.** 2005. Ammonia concentration evaluation in deep-bedded and concrete floor housing systems for grow-finish swine in Brazil. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. (eds) T. Brown-Brandl and R. Maghirang. St Joseph, MI: ASAE, Pp 485-487. LCCN 2005924086. ASAE Pub #701P0205.
241. Davis*, J.D., M.J. Darr, **H. Xin**, J.D. Harmon, T.M. Brown-Brandl. 2005. Development of a Low-Cost GPS Herd Activity and Welfare Kit (HAWK) For Livestock Monitoring. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. (eds) T. Brown-Brandl and R. Maghirang. St Joseph, MI: ASAE, Pp 607-612. LCCN 2005924086. ASAE Pub #701P0205.
242. Dong, H., Z. Zhu, Y. Li, X. Tao, and **H. Xin.** 2005. Temporal variation of greenhouse gas emission in swine gestation building. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. (eds) T. Brown-Brandl and R. Maghirang. St Joseph, MI: ASAE, Pp 396-401. LCCN 2005924086. ASAE Pub #701P0205.
243. Gates, R.S., K. D. Casey, A. J. Pescatore, E.F. Wheeler, and **H. Xin.** 2005. Assessing annual U.S. broiler chicken house emissions. Paper # 1292, Air and Waste Management Association
244. Li*, H., **H. Xin**, and Y. Liang. 2005. Moisture production of a commercial laying hen house with manure belt. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. (eds) T. Brown-Brandl and R. Maghirang. St Joseph, MI: ASAE, Pp 162-170. LCCN 2005924086. ASAE Pub #701P0205.
245. Tao, X., H. Dong, Z. Zhang, and **H. Xin.** 2005. Daily variation of Thyroid hormones in broilers under high temperature conditions. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. (eds) T. Brown-Brandl and R. Maghirang. St Joseph, MI: ASAE, Pp 516-523. LCCN 2005924086. ASAE Pub #701P0205.
246. **Xin, H.** and B. Shao. 2005. Real-time behavior-based assessment and control of swine thermal comfort. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. (eds) T. Brown-Brandl and R. Maghirang. St Joseph, MI: ASAE, Pp 694-702. LCCN 2005924086. ASAE Pub #701P0205.
247. Zhu, Z., H. Dong, X. Tao, and H. Xin. 2005. Evaluation of airborne dust concentration and effectiveness of cooling fan with spray-misting system in swine gestation houses. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. (eds) T. Brown-Brandl and R. Maghirang. St Joseph, MI: ASAE, Pp 224-229. LCCN 2005924086. ASAE Pub #701P0205.
248. Li*, H., **H. Xin**, and Y. Liang. 2005. Effects of stack surface to volume ratio and air exchange rate on ammonia emission of laying hen manure storage. Paper #1157, Air and Waste Management Association.
249. Li*, H., **H. Xin**, and Y. Liang. 2005. Moisture production of commercial manure-belt laying hen houses. Proc of the 7th International Livestock Environment Symposium, May 18-20, 2005, Beijing, China. St Joseph, MI: ASAE

250. Brown-Brandl, T.M., J.A. Nienaber, **H. Xin**, and R. S. Gates. 2003. A literature review of swine heat and moisture production. Proc. of the 2nd International Swine Housing Symposium, October 11-14, 2003, Raleigh, NC., St. Joseph, MI: ASAE.
251. Casey, K.D., R.S. Gates, E.F. Wheeler, **H. Xin**, J. Zajackowski, P. Topper and Y. Liang. 2003. Ammonia emissions from broiler houses in Kentucky during cold weather. Proc of the Gaseous and Odor Emissions from Animal Production Facilities, Scandic Hotel Bygholm Park, Horsens, Denmark, June 1-4, 2003.
252. Liang, Y., **H. Xin**, A. Tanaka, S. H. Lee, H. Li, E. F. Wheeler, R. S. Gates, J. S. Zajackowski, P. Topper and K. D. Casey. 2003. Ammonia emissions from layer houses in Iowa. Proc of the Gaseous and Odor Emissions from Animal Production Facilities, Scandic Hotel Bygholm Park, Horsens, Denmark, June 1-4, 2003.
253. Liang*, Y., **H. Xin**, A. Tanaka, S. H. Lee, H. Li, E. F. Wheeler, R. S. Gates, J. S. Zajackowski, P. Topper and K. D. Casey. 2003. Ammonia Emissions from U.S. Poultry Houses: Part II – Layer Houses. In Proc. Third International Conference on Air Pollution from Agricultural Operations. Oct 12-13, 2003, Raleigh, NC, pp147-158.
254. Lim, T.T., A. J. Heber, J. Q. Ni, X. Gallien, and **H. Xin**. 2003. Air quality measurement at a laying hen house: Particulate matter concentrations and emissions. In Proc. Third International Conference on Air Pollution from Agricultural Operations. Oct 12-13, 2003, Raleigh, NC, pp249-256.
255. Wheeler, E. F., J. S. Zajackowski, P. A. Topper, R. S. Gates, **H. Xin**, K. D. Casey, and Y. Liang. 2003. Ammonia emissions from broiler houses in Pennsylvania during cold weather. Proc of the Gaseous and Odor Emissions from Animal Production Facilities, Scandic Hotel Bygholm Park, Horsens, Denmark, June 1-4, 2003.
256. Wheeler, E. F., K.D. Casey, J.S. Zajackowski, P.A. Topper, R.S. Gates, **H. Xin**, Y. Liang, and A. Tanaka. 2003. Ammonia Emissions from U.S. Poultry Houses: Part III – Broiler Houses. In Proc. Third International Conference on Air Pollution from Agricultural Operations. Oct 12-13, 2003, Raleigh, NC.
257. **Xin, H.**, Y. Liang, A. Tanaka, R.S. Gates, E.F. Wheeler, K.D. Casey, A.J. Heber, J. Ni and H. Li. 2003. Ammonia emissions from U.S. poultry houses: Part I – Measurement system and techniques. In Proc. Third International Conference on Air Pollution from Agricultural Operations. Oct 12-13, 2003, Raleigh, NC.
258. Chepete*, H. J. and **H. Xin**. 2001. Heat and moisture production of poultry and their housing systems – A literature review. Proc. of the 6th International Livestock Environment Symposium, May 21-23, 2001, Louisville, Kentucky, pp319-335. LCCN 2001090005, St. Joseph, MI: ASAE.
259. Puma*, M. C., **H. Xin**, R. S. Gates, and D. U. Ahn. 2001. Effects of drinking water temperature on laying hens subjected to warm cyclic environmental conditions. Proc. of the 6th International Livestock Environment Symposium, May 21-23, 2001, Louisville, Kentucky, pp235-243. LCCN 2001090005, St. Joseph, MI: ASAE.
260. Yanagi*, T. Jr, **H. Xin**, and R. S. Gates. 2001. Measurement and control system for studying animal-environment interactions. Proc. of the World Congress of Computers in Agriculture and Natural Resources, September 19-21, 2001, Iquassu Falls, Brazil. St. Joseph, MI: ASAE.
261. **Xin, H.** and B. Shao. 2001. Real-time assessment of swine thermal comfort by computer vision. Proc. of the World Congress of Computers in Agriculture and Natural Resources, September 19-21, 2001, Iquassu Falls, Brazil. St. Joseph, MI: ASAE.
262. **Xin, H.**, I. L. Berry, G. T. Tabler, and T. A. Costello. 2001. Heat and moisture production of broiler chickens in commercial housing conditions. Proc. of the 6th International Livestock Environment Symposium, May 21-23, 2001, Louisville, Kentucky, pp309-318. LCCN 2001090005, St. Joseph, MI: ASAE.

263. **Xin, H.** and M. C. Puma. 2001. Cooling caged laying hens in high-rise house by fogging inlet air. Proc. of the 6th International Livestock Environment Symposium, May 21-23, 2001, Louisville, Kentucky, pp244-249. LCCN 2001090005, St. Joseph, MI: ASAE.
264. Yanagi*, T. Jr., G. S. Damasceno, V. H. Teixeira, and **H. Xin**. 2001. Prediction of black globe humidity index in poultry buildings. Proc. of the 6th International Livestock Environment Symposium, May 21-23, 2001, Louisville, Kentucky, pp482-489. LCCN 2001090005, St. Joseph, MI: ASAE.
265. Zhang, Q. and **H. Xin**. 2000. Effects of creep heat type and locatuion on its usage by piglets in farrowing crates. Proc. of the First International Conference on Swine Housing, October 9-11, 2000, Des Moines, IA, pp365-374. LCCN 00-134445, St. Joseph, MI: ASAE.
266. **Xin, H.** and Lorimor. 1998. Nutrient profile and production volume of manure from high-rise housed layers. In: Proceedings of the 1998 Midwest Poultry Federation Convention, March 17-19, 1998. St. Paul, MN.
267. Han*, T. and **H. Xin**. 1997. Performance and energetics of neonatal chicks as influenced by intermittent "in-transit" lighting regimens. Proc. of the 5th International Livestock Environment Symposium, May 29-31, 1997, Minneapolis, MN, pp948-953.
268. Harmon, J.D., **H. Xin**, and J. Shao. 1997. Thermal needs of SEW pigs. Proc. of the 5th International Livestock Environment Symposium, May 29-31, 1997, Minneapolis, MN, pp482-488
269. **Xin, H.** and K. Lee. 1997. Physiological responses of chicks to post-hatch nutritional conditions. Proc. of the 5th International Livestock Environment Symposium, May 29-31, 1997, Minneapolis, MN, pp954-958.
270. Shao*, J., **H. Xin**, and J.D. Harmon. 1997. Image analysis of swine behavior to determine their thermal comfort. Proc. of the 5th International Livestock Environment Symposium, May 29-31, 1997, Minneapolis, MN, pp468-475.
271. Tanaka*, A., **H. Xin**, and T. Osterhaus. 1997. Air flow rates of chick transport containers as influenced by container structure and stacking configuration. Proc. of the 5th International Livestock Environment Symposium, May 29-31, 1997, Minneapolis, MN, pp130-137.
272. Zhou*, H., **H. Xin**, and D.S. Bundy. 1997. Heat lamp needs of neonatal pigs. Proc. of the 5th International Livestock Environment Symposium, May 29-31, 1997, Minneapolis, MN, pp489-495.
273. **Xin, H.** 1996. An automated data acquisition system for field animal environment research. In: Proc. of the International Conference on Agricultural and Bioenvironmental Engineering held in Beijing, China, August 15-19, 1996, ppIII-10~18.
274. **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.
275. 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.
276. 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.
277. **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

278. 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).

279. **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.
280. **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.
281. **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.
282. **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.
283. **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
284. **Xin, H.** 2016. Poultry housing systems. A lecture presentation to the TSM 327 class, Nov. 28, 2016, Ames, IA, USA
285. **Xin, H.** 2016. Egg production systems: *pros and cons*. An invited presentation at the SusAg Graduate Program Colloquium, Nov. 16, 2016, Ames, IA, USA
286. **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.
287. **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.
288. **Xin, H.** 2016. Poultry production systems: Part II – laying hens. A guest lecture presentation to the AnSci223 class, Oct. 5, 2016, Ames, IA, USA.
289. **Xin, H.** 2016. Poultry production systems: Part I – meat birds. A guest lecture presentation to the AnSci223 class, Oct. 3, 2016, Ames, IA, USA.
290. **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.
291. **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.
292. **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.
293. 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.
294. **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.
295. **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.
296. **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
297. **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
298. **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.

299. **Xin, H.** 2016. Poultry housing systems. A guest lecture presentation to the AnSci223 class, March 23, 2016, Ames, IA, USA.
300. **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
301. **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
302. **Xin, H.** 2016. Environment and egg production. A keynote presentation at the 9th International Congress of AVEM2016, February 24-25, 2016, Queretaro, Mexico.
303. **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
304. **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
305. **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
306. **Xin, H.** 2015. U.S. poultry production systems. A guest lecture presentation to the TSM327 class, Nov. 4, 2015, Ames, IA, USA.
307. **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.
308. **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
309. **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.
310. **Xin, H.** 2015. U.S. poultry production systems. A guest lecture presentation to the SusAg515 class, Sept. 1, 2015, Ames, IA, USA.
311. **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.
312. **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.
313. **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.
314. **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.
315. **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.
316. **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.
317. **Xin, H.** 2014. Research on animal environment and behavior. An invited presentation at the Workshop on Animal Environment and Welfare held Sept 13-14, 2014, Harbin, China.
318. **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.

319. **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).
320. **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.
321. **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.
322. **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.
323. **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.
324. **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.
325. **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.
326. **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.
327. **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.
328. **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.
329. **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.
330. **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.
331. **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.
332. **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.
333. **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.
334. **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.
335. **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

336. **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.
337. **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.
338. **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.
339. **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.
340. **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.
341. **Xin, H.** 2012. Animal indirect calorimeter – theory and applications. A lecture to the graduate-level class “Environmental Physiology”, Nov 6, 2012, CAU, Beijing, China.
342. **Xin, H.** 2012. Animal housing ventilation systems and management. A lecture to the graduate-level class “Environmental Physiology”, Nov 7, 2012, CAU, Beijing, China.
343. **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.
344. **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.
345. **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.
346. **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.
347. **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.
348. **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
349. **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.
350. **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.
351. **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.
352. **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.

353. **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
354. **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.
355. **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.
356. **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
357. **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
358. **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.
359. **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
360. **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),
361. **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
362. **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
363. 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
364. **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
365. **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
366. **Xin, H.** 2011. Update of the Egg Industry Center and related program. Nebraska Poultry Industry Convention, Feb 23-25, 2011, Columbus, NE, USA
367. **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
368. **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
369. **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
370. **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

371. **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
372. **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
373. **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
374. **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
375. **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
376. **Xin, H.** 2009. Cooling poultry in tropical climates. Ensminger International Conference, February 7-14, 2009, San Jose, Costa Rica
377. **Xin, H.** 2008. Overview of air emission remediation technologies. National Poultry Waste Management Symposium, October 21-23, 2008, Des Moines, IA, USA
378. **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
379. **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
380. **Xin, H.** 2008. Monitoring of air emissions from Midwest turkey barns. National Turkey Federation Annual Convention, February 10-12, 2008, San Diego, CA, USA
381. **Xin, H.** 2007. Improving air quality by managing ammonia and humidity. Pennsylvania Poultry Sales and Service Conference, September 18-20, 2007, Lancaster, PA, USA
382. **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
383. **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
384. **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
385. **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
386. **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
387. **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
388. **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
389. **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
390. **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

391. **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
392. **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
393. **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.
394. **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
395. **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
396. **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
397. **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
398. **Xin, H.** 1997. Too hot or too cold? Ask the pigs. *ASAE Resource magazine* (1): 7-8. (Feature article invited by the ASAE).
399. **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
400. **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
401. **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
402. **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
403. **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
404. **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
405. **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.
6. Jenkins, J.D., R.L. Parsons, M.D. Hayes, **H. Xin**, S. Millman. 2012. Litter use in an aviary laying hen housing system. A.S. Leaflet-R2720. Animal Industry Report, Iowa State University Extension, Ames, IA.
7. **Xin, H.**, H. Li, R.T. Burns, J. Kliebenstein, M. Ibarburu, S.A. Roberts, K. Bregendahl. 2011 Mitigating ammonia emissions from high-rise hen houses through dietary manipulation. A.S. Leaflet 11-67, Animal Industry Report, Iowa State University Extension, Ames, IA.
8. **Xin, H.**, H. Li, R.S. Gates, and R.T. Burns. 2010. Methodologies and protocols for analysis of raw data to minimize uncertainty of resultant emissions estimation. A white paper written for the USDA Agricultural Air Quality Task Force Workshop on Livestock and Poultry Air Emissions Standardization held Sept 27-28, 2010, Raleigh, NC.
9. **Xin, H.**, H. Li, R.T. Burns, S.A. Roberts, S. Li, K. Bregendahl, J. B. Kliebenstein. 2009. Mitigating ammonia emissions from laying-hen houses through dietary manipulation. Proceedings of the Egg Industry Issues Forum hosted by the Egg Industry Center, Ames, Iowa, held on April 8, 2009, Des Moines, Iowa, pp48-58.
10. Burns, R.T., R. Swestka, **H. Xin**, et al. 2008. Development of a wireless sensor network to quantify spatial and temporal H₂S concentrations in swine houses (A Progress Report) Animal Industry Report. A.S. Leaflet R2436. Iowa State University Extension, Ames, IA.
11. Li, H., **H. Xin**, and R.T. Burns. 2008. Ammonia and PM emissions from a tom turkey barn in Iowa. Animal Industry Report. A.S. Leaflet R2449. Iowa State University Extension, Ames, IA.
12. Li, H. **H. Xin**, R.T. Burns, S.A. Roberts, K. Bregendahl. 2008. Effects of dietary modification on laying hens in high-rise houses: Part I – ammonia, hydrogen sulfide and carbon dioxide gaseous emissions. Animal Industry Report. A.S. Leaflet R2450. Iowa State Univ. Extension, Ames, IA.
13. Roberts, S.A. H., Li, **H. Xin**, R.T. Burns, and K. Bregendahl. 2008. Effects of dietary modification on laying hens in high-rise houses: Part II – hen production performance. Animal Industry Report. A.S. Leaflet R2451. Iowa State University Extension, Ames, IA.
14. Davis, J.D., **H. Xin**, and R. McDonald. 2005. Creep temperature distributions of incandescent heat lamps. A.S. Leaflet R2152. Iowa State University Extension, Ames, IA.
15. Roberts, S. **H. Xin**, B. Kerr, J. Russell, K. Bregendahl. 2005. Adding fiber to the diet of laying hens reduces ammonia emissions. Proc. of the Iowa Egg Industry Symposium, Iowa State University Extension, Ames, Iowa, pp 29-37.
16. **Xin, H.**, H. Li, and Y. Liang. 2005. Update on ammonia emission mitigation for laying hen facilities. Proc. of the Iowa Egg Industry Symposium, Iowa State University Extension, Ames, Iowa, pp 38-46.
17. **Xin, H.**, H. Li, Y. Liang, and J. Richardson. 2005. Update on ammonia emission mitigation for egg facilities. A.S. Leaflet. Leaflet R2135. Iowa State University Extension, Ames, IA.

18. Xin, H. 2005. Instruments for measuring concentrations and emission rates of gases and particulates from animal feeding operations. PM 1990, Iowa State University Extension
19. 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, Iowa State University, pp41-47.
20. Cook, R.N. and **H. Xin**. 2004. Effects of cage stocking density on feeding behaviors of group-housed laying hens. College of Agriculture Research Report, ASL # 516, Iowa State University.
21. Liang, Y., **H. Xin**, and H. Li. 2004. Dietary manipulation to reduce ammonia emission from high-rise layer houses. College of Agriculture Research Report, ASL # 517, Iowa State University.
22. Liang, Y., **H. Xin**, H. Li, and E. F. Wheeler. 2004. Ammonia emissions from layer houses. College of Agriculture Research Report, ASL # 518, Iowa State University.
23. Liang, Y. and **H. Xin**. 2004. Performance of Single Point Monitor in measuring ammonia and hydrogen sulfide gases. College of Agriculture Research Report, ASL # 519, Iowa State University.
24. Li, H., **H. Xin**, and Y. Liang. 2004. Indirect Measurement of Building Ventilation Rate for Manure-belt Laying Hen House Using CO₂ Balance. College of Agriculture Research Report, ASL # 520, Iowa State University.
25. **Xin, H.**, Y. Liang, R.S. Gates, and E. F. Wheeler. 2002. Measurement of ammonia emissions from laying hen houses. Proceedings of the Iowa Poultry Industry Symposium held in Scheman Continuation Education Center on November 12, 2002, Ames, Iowa. Pp 53-58.
26. **Xin, H.** 2000. Cooling laying hens by low-pressure sprinkling or high-pressure fogging. Proceedings of the Iowa Poultry Symposium held in Scheman Continuation Education Center on February 17, 2000, Ames, Iowa. Pp 43-47.
27. Researcher offers study on cooling poultry houses. *Poultry Times*, March 20, 2000: 16.
28. **Xin, H.** 2000. Sprinkling and fogging can help cool laying hens. *Poultry Times*, April 17, 2000: 3 & 13.
29. **Xin, H.** 1999. Nutrient profile, manure production of layers. *Poultry Times – Supplement*. April 19, 1999: 2A.
30. Keeping wean-to-finish trouble free. *Pork'99/July*: 25.
31. **Xin, H.**, J.D. Harmon, R.C. Ewan, D.L. Harris, and M.L. Gramer. 1999. Transporting isowean pigs – Part I: nutritional perspective. *Swine Research Report*. ISU Extension, AS 642: 150-156, Ames, Iowa.
32. **Xin, H.**, Q. Zhang, M. Puma, J.D. Harmon, D.L. Harris, and M.L. Gramer. 1999. Transporting isowean pigs – Part II: thermal environment perspective. *Swine Research Report*. ISU Extension, AS 642: 157-164, Ames, Iowa.
33. **Xin, H.**, and Q. Zhang. 1999. Surface temperature of creep heat mat as affected by piglet usage. *Swine Research Report*. ISU Extension, AS 642: 143-149, Ames, Iowa.
34. Ye, W. and **H. Xin**. 1999. Resting behavior indexes for thermal comfort assessment of young pigs. *Swine Research Report*. ISU Extension, AS 642: 134-142, Ames, Iowa.
35. Nutrients aid chick growth in overseas shipments. 1999. *Poultry Times*, July 26: 16.
36. High-rise layer house manure volume and nutrient control. 1998. *Egg Industry*, August 1998: 10.
37. Iowa researchers find disparity in state manure estimates. 1998. *Poultry Times*, Sept 7, 1998:12
38. **Xin, H.** 1998. Surface temperature distribution of commercial heat mats for swine creep heating. *Swine Research Report*. ISU Extension, AS 640: 115-120, Ames, Iowa.
39. **Xin, H.** 1998. Old litter brooding for broilers needs proper ventilation. *Poultry Times*, October 19.
40. **Xin, H.** 1998. Cold weather ventilation guidelines for young turkeys. Year End 1998 Edition of *Turkey Talk*, the Official Publication of the Iowa Turkey Federation, Ames, Iowa.
41. **Xin, H.** 1998. Efficacy of sprinkling on heat stress alleviation and dust reduction in layer houses. A demonstration project report to Farmegg Products, Humboldt, IA and CATD.

42. Harmon, J.D., T.J. Baas, S.J. Hoff, and **H. Xin**. 1998. Case study comparison of three styles of swine facilities. *Swine Research Report*. ISU Extension, AS 640: 133-136, Ames, Iowa.
43. Energy savings in swine production – Iowa Energy Success Story. 1998. *Watt Savers*: 2-7.
44. Porcine computerized comfort. 1998. *Visions Winter 1998*: 7.
45. **Xin, H.** and H. Zhou. 1997. Responses of piglets to heat lamps with variable vs. constant wattage output and clear vs. red radiant rays. *Swine Research Report*. ISU Extension AS-638: 53-56. Ames, Iowa.
46. **Xin, H.** and J.D. Harmon. 1997. Heat stress index and alleviation measures for layers, turkeys, swine, and cattle. ABE Extension WWW home page (<http://www.ae.iastate.edu/livestoc.htm>), Iowa State University, Ames, Iowa.
47. Computer would measure pigs' comfort. 1997. *Kearney (Neb) Daily Hub*. July 16, 1997.
48. Computer helps keep pigs comfy. 1997. *Capper's*. September 9, 1997.
49. It's a pig's life. 1997. *The Harold Journal, Logan, Utah*.
50. Little pigs, are you comfortable. 1997. *Waukesha Freeman*. July 15, 1997.
51. Little pigs, are you comfortable. 1997. *Boone County Ag Life*. July 8, 1997.
52. Wallowing in comfort. 1997. *Waterloo-Cedar Falls Courier*. July 7, 1997.
53. **Xin, H.** 1996. Principles of Poultry House Ventilation. Proceedings of 1996 Iowa Poultry Symposium. College of Veterinary Medicine. Iowa State University, Ames, Iowa, pp5-18.
54. Harmon, J.D. and **H. Xin**. 1996. Thermal performance of a hoop structure for finishing swine. *Swine Research Report*. ISU Extension AS-634: 104-106. Ames, Iowa.
55. Harmon, J.D., **H. Xin**, and J. Shao. 1996. Evaluation of the thermal needs of the early weaned pig. *Swine Research Report*. ISU Extension AS-634: 87-91. Ames, Iowa.
56. Hoff, S.J., J.D. Harmon, **H. Xin**, and L. Dong. 1996. Treating ventilation exhaust air for odor control. *Swine Research Report*. ISU Extension AS-634: 111-116. Ames, Iowa.
57. Shao, J., **H. Xin**, and J.D. Harmon. 1996. Neural network analysis of postural behavior of young swine to determine their thermal comfort. *Swine Research Report*. ISU Extension AS-634: 125-128. Ames, Iowa.
58. **Xin, H.**, H. Zhou, and D.S. Bundy. 1996. Heat lamp usage by neonatal piglets. *Swine Research Report*. ISU Extension AS-634: 117-124. Ames, Iowa.
59. **Xin, H.**, H. Zhou, and D.S. Bundy. 1995. Comparison of 250W vs. 175W radiant heat lamps for swine farrowing operation. *Swine Research Report*. ISU Extension AS-633: 129-131. Ames, IA.
60. Harmon, J.D. and **H. Xin**. 1995. Environmental guidelines for confinement swine housing. Pm-1586a. Iowa State University, Ames, Iowa.
61. Harmon, J.D. and **H. Xin**. 1995. Choosing fans for livestock and poultry ventilation. Pm-1587. Iowa State University, Ames, Iowa.
62. **Xin, H.** and V.J. McFadden. 1995. Tunnel ventilation to alleviate animal heat stress. Pm-1606. Iowa State University, Ames, Iowa.
63. Harmon, J.D. and **H. Xin**. 1994. Health hazards in swine confinement housing: How bad is bad? AEN-156. Iowa State University, Ames, Iowa.
64. Harmon, J.D., R. Zhang, and **H. Xin**. 1994. Human health concerns in livestock and poultry housing. AEN-157. Iowa State University, Ames, Iowa.
65. **Xin, H.** and I.L. Berry. 1993. Broiler research verification for energy efficiency and optimum production-summary of 1991, 1992 & 1993 test results. Univ. of Arkansas, Fayetteville, AR.

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 **\$23,503,550** 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 |
|--|-------------------|------------|---|---------------------|---------------------------------|
| 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, Soupier | 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 |
| <i>F</i> 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-advisor) | 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 at various environmental conditions | 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. Verhoijssen | 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 |

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

| Name | Degree/ Position | Thesis Title or Area of Training | Support ^{\$} | Start | Finish |
|-----------------------------|---------------------|---|-----------------------|--------|-----------------|
| Green, Angela [%] | Ph.D. | A systematic evaluation of laying-hen housing systems for improved hen welfare | NSF Fellow/G | Aug 04 | Jan 08 |
| 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 by understanding their behaviors and improved facility design | 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 factors in enriched colony 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 |
| 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), Assistant 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 (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 (CAL S) Air Quality Issue Team (2003–present)
- CAL S Avian Influenza Issue Team (2006–2010)
- CAL S Distinguished Professor Screening Committee (2015)
- CAL S Diversity Committee (1997–2001; 2009–2010; 2010–2011)
- CAL S Promotion and Tenure Advisory Committee (2003–2006)
- 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 (2003–2004)
- 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 for Board of Directors, 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 2017 International Symposium on Animal Environment and Welfare sponsored by the International Research Center for Animal Environment and Welfare (www.ircaew.org), October 22-24, 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
- 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), October 22-24, 2011; October 19-22, 2013; Oct 23-26, 2015, Chongqing, 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 | Duration |
|-----------------|----------------------|-------------------|---------------------|
| 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 | Jan'15 – |
| 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. 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, since 2002 Dr. Xin has been serving as co-advisor or committee member for more than 10 graduate students at UFV through the so-called 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, with Dr. Brian Steward serving 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), Katholic 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 again 2017 symposia.
- Since the late 90's Dr. Xin has been collaborating with Professor Daniel Berckmans at the Katholic 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. A multi-national PLF proposal involving Dr. Xin is now pending.
- 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 times), Canada (multiple times), China (multiple times), Columbia, Costa Rica (multiple times), Denmark, France (multiple times), Germany, Italy, Japan (multiple times), Mexico (multiple times), Spain, The Netherlands (multiple times), and the United Kingdom (multiple times).
- Dr. Xin has hosted/mentored international visiting scientists/scholars/delegates from Australia, Belgium, Botswana, Brazil, Canada, China, Denmark, Germany, Greece, Japan, Korea, Morocco, Russia, The Netherlands, Turkey, the 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 (ISAE2011) sponsored by the International Research Center for Animal Environment and Welfare (IRCAEW), Oct 23-25, 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)