

## Hongwei Xin, Ph.D.

C.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: 515-294-4240; Mobile: 515-450-2593; Fax: 515-294-4250; [hxin@iastate.edu](mailto: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	1989
M.S.	Agricultural Engineering, University of Nebraska	1985
B.S.	Agricultural Engineering, Shenyang Agricultural University, China	1982

### PROFESSIONAL EXPERIENCE

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

### RESEARCH, EXTENSION AND ADMINISTRATION PROGRAMS

Research and Extension Programs: Air quality issues related to animal feeding operations with emphasis on measurement and mitigation of aerial emissions; Impacts of housing and management factors on animal behavior, well-being, environmental impact (indoor air quality, environmental footprint, energy use), production efficiency, and ultimately sustainability of livestock and poultry operations.

Administration: As director of the Egg Industry Center, oversee the operation of Egg Industry Center whose mission is to add value to the egg industry by facilitating research and learning for egg producers, processors and consumers through national and international collaborations.

### AWARDS AND HONORS

- Charles F. Curtiss Distinguished Professor, Iowa State University (2014)
- USPOULTRY's 2014 Workhorse of the Year Award (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 into the ISU Osborn Research Club (2013)

- Iowa State University College of Engineering Superior Extension Award (2012)
- 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 for the International Research Center for Animal Environment and Welfare headquartered at the Chongqing Academy of Animal Sciences, Rongchang, Chongqing, China (2012–2016)
- Member of the United Egg Producers Ammonia Task Force (2013–present)
- Member of the United Egg Producers 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 College of Agriculture and Life Sciences Outstanding Achievement in International Agriculture Award (2010)
- Guest Professor, College of Biosystems Engineering and Food Science, Zhejiang University (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 the University of Guelph (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–present)
- Inducted to the Grade of Fellow of the American Society of Agricultural and Biological Engineers (ASABE) (2008)
- ISU College of Engineering David R. Boylan Eminent Faculty Research Award (2008)
- Appointment of Adjunct Professor of China Agricultural University, Beijing, China (2008)
- 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 (2001)
- Young Member of the Year Award, Mid-Central Section of the ASAE (2001)
- Young Engineer of the Year Award, Iowa Section of the ASAE (2001)

- Representing ASABE at the Installation Ceremony of ISU 14<sup>th</sup> 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 (10)
  - Five Superior Paper Awards (1997[2], 2000, 2005[2]) (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 30+ 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 50+ international conferences or workshops (Belgium, Brazil – multiple times, Canada, China – multiple times, Columbia, Costa Rica – multiple times, Denmark, France, Germany, Italy, Japan, the Netherlands, Spain, United Kingdom) (since 1995)
- 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 9<sup>th</sup> International Livestock Environment Symposium (2011–2012)
  - Program Chair of the 8<sup>th</sup> International Livestock Environment Symposium (2006–2008)
  - Structure and Environment (SE) Division Program Chair (2003–2005)
  - Associate Editor of SE Division (1994–2004; 2009–present)
  - Meetings Council – SE Representative (2003–2005)
  - Publications Council – Member at large (2003–2005)
  - Planning Committee for the 7<sup>th</sup> 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
  - Poultry Science Association
  - Sigma Xi Scientific Research Society

**PUBLICATIONS****Refereed Journal Articles** (in chronological order. \* indicates Dr. Xin as the first author's mentor)

1. Akarmi\*, 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.
2. 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.
3. 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.
4. 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.
5. Karcher, D.M., D.R. Jones, Z. Abdo, Y. Zhao, T.A. Shepherd, and **H. Xin**. 2014. Impact of commercial housing system and nutrition and energy intake on laying hen performance and egg quality parameters. *Poultry Science* (accepted for publication).
6. 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.
7. 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)
8. 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.
9. 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
10. 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):
11. 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.
12. 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.
13. 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.
14. 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.
15. 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.
16. 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.

17. 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.
18. 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.
19. 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.
20. 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.
21. 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.
22. Zhao\*, Y., **H. Xin**, and B. Dong. 2013. Use of infrared thermography to assess laying-hen feather coverage. *Poultry Science* 92(2):295-302.
23. 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.
24. 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.
25. Zheng\*, W., Y. Zhao, **H. Xin**, B. Li, R.S. Gates, Y. Zhang and M.L. Soupier. 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.
26. 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.
27. 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.
28. 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.
29. 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.
30. 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.
31. 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.
32. Walker, L., T. Wang, **H. Xin**, and D. Dolde. 2012. Supplementation of laying-hen feed with palm tocos and algal astaxanthin for egg yolknutrient enrichment. *J. Agric. Food Chem.* 60:1989-1999.
33. 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.
34. 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.

35. Chepete\*, J.H., **H. Xin**, and H. Li. 2011. Ammonia emissions of laying hen manure as affected by accumulation time. *J. Poult. Sci.*, 48:138-143, 2011.
36. 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.
37. 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
38. 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>
39. 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.
40. Li\*, H., **H. Xin**, R. T. Burns, L. D. Jacobson, S. Noll, S. J. Hoff, J. D. Harmon, J. A. Koziel, I. Celen, B. Hetchler. 2011. Air emissions from tom and hen turkey houses in the U.S. Midwest. *Transactions of the ASABE* 54(1): 305-314.
41. Muhlbauer R.V., T.A. Shepherd, H. Li, R.T. Burns, **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.
42. Pang, Z., B. Li, **H. Xin**, L. Xi, W. Cao, C. Wang, W. Li. 2011. Field evaluation of a water-cooled cover for cooling sows in hot and humid climates. *Biosystems Engineering* 110(2011):413-420
43. 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.
44. **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
45. 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.
46. 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.
47. 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.
48. Huang, Y., Dong, H., B. Shang, and **H. Xin**, and Z. Zhu. 2010. Characterization of animal manure and cornstalk ashes as affected by incineration temperature. *Applied Energy* 88(2011): 947-952.
49. 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.
50. 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.
51. 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.
52. 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.

53. 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.
54. 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.
55. 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.
56. 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.
57. 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.
58. 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.
59. **Xin, H.**, H. Li., Burns, R.S. Gates, D.G. Overhults, and J.W. Earnest. 2009. Use of CO<sub>2</sub> concentration or CO<sub>2</sub> balance to assess ventilation rate of commercial broiler houses. *Transactions of the ASABE* 52(4): 1353-1361.
60. 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.
61. 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.
62. 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.
63. 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.
64. 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.
65. 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.
66. Li\*, H., **H. Xin**, R.T. Burns, Y. Liang. 2008. Reduction of ammonia emission from stored poultry manure using additives: Zeolite, Al<sup>+</sup>Clear, Ferix-3 and PLT. *J. App. Poult. Res.* 17(4): 421-431.
67. 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.
68. 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 Publication of ASABE* (289 pages): [http://asae.frymulti.com/aqap\\_handbook.asp?confid=aqap2008](http://asae.frymulti.com/aqap_handbook.asp?confid=aqap2008)
69. 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.
70. 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.



71. 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.
72. 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**)
73. 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.
74. 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.
75. Dong, H., Z. Zhu, and **H. Xin**. 2007. Greenhouse gas emissions from swine buildings of various production stages in suburban Beijing, China. *Atmospheric Environment* 41: 2391-2399.
76. 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.
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167. **Xin, H.** Indirect Animal Calorimetry. In: *Biomeasurement and Experimental Techniques for Avian Species* (in review; to be published by CRC).
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[Role: Chair of the multiple-author chapter committee - coordinating composition of the initial draft, writing sections of the chapter, editing and revising the chapter.]
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**Invited Articles, Lectures, and Presentations**

250. **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.
251. **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.
252. **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.
253. **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).
254. **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.
255. **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.
256. **Xin, H., N. Pelletier, M. Ibarburu.** 2014. U.S. egg industry environmental footprint in 1960 and 2010. Presentation at the 49<sup>th</sup> Egg Farmer of Ontario Annual Conference, March 25, 2014; Toronto, Canada.
257. **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.
258. **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.
259. **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.
260. **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.
261. **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.
262. **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.
263. **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.
264. **Xin, H.** 2013. U.S. egg industry and the Egg Industry Center. A lecture to AnSci 501 (Graduate Seminar), Sept 30, 2013; Iowa State University, Ames, IA, USA.
265. **Xin, H.** 2013. Environmental control for poultry production. An invited plenary presentation at the 16<sup>th</sup> China National Poultry Science Symposium, May 13-15, 2013; Yangzhou, China.
266. **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.

267. **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.
268. **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.
269. **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
270. **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.
271. **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.
272. **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.
273. **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.
274. **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.
275. **Xin, H.** 2012. Animal indirect calorimeter – theory and applications. A lecture to the graduate-level class “Environmental Physiology”, Nov 6, 2012, CAU, Beijing, China.
276. **Xin, H.** 2012. Animal housing ventilation systems and management. A lecture to the graduate-level class “Environmental Physiology”, Nov 7, 2012, CAU, Beijing, China.
277. **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.
278. **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.
279. **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.
280. **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.
281. **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.
282. **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
283. **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.
284. **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.

285. **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.
286. **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.
287. **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
288. **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.
289. **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.
290. **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.
291. **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
292. **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.
293. **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
294. **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),
295. **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
296. **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
297. 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
298. **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
299. **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
300. **Xin, H.** 2011. Update of the Egg Industry Center and related program. Nebraska Poultry Industry Convention, Feb 23-25, 2011, Columbus, NE, USA
301. **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
302. **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
303. **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.

304. **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.
305. **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.
306. **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
307. **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.
308. **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
309. **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.
310. **Xin, H.** 2009. Cooling poultry in tropical climates. Ensminger International Conference, February 7-14, 2009, San Jose, Costa Rica.
311. **Xin, H.** 2008. Overview of air emission remediation technologies. National Poultry Waste Management Symposium, October 21-23, 2008, Des Moines, IA, USA
312. **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
313. **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
314. **Xin, H.** 2008. Monitoring of air emissions from Midwest turkey barns. National Turkey Federation Annual Convention, February 10-12, 2008, San Diego, CA, USA
315. **Xin, H.** 2007. Improving air quality by managing ammonia and humidity. Pennsylvania Poultry Sales and Service Conference, September 18-20, 2007, Lancaster, PA, USA
316. **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
317. **Xin, H.** 2007. Update on turkey barn air emissions monitoring. Turkey Research Review/APV Symposium, September 27, 2007, Holiday Inn & Convention Center, Willmar, MN
318. **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.
319. **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
320. **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
321. **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
322. **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
323. **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



324. **Xin, H.** 2004. Air emissions form egg operations – current state and future needs. Presentation at the United Egg Producers Annual Convention held on Oct 20-22, 2004 in New Orleans, LA, USA
325. **Xin, H.** 2004. Ammonia emission form laying hen house in Iowa. Presentation to a joint meeting of the United Egg Producers and United Egg Board Executive Committees held on Jan 26-27, 2004 in Atlanta, GA, USA.
326. **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.
327. **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, held on November 5-7, 2001, Beijing, China, pp29-32.
328. **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.
329. **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.
330. **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.
331. **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.
332. **Xin, H.** 1997. Too hot or too cold? Ask the pigs. *ASAE Resource magazine* (1): 7-8. (Feature article invited by the ASAE).
333. **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.
334. **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.
335. **Xin, H.** 1996. Automated data acquisition system for field animal environmental research. The 1<sup>st</sup> International Conference on Agricultural and Biological Environmental Engineering, Aug. 15-19, 1996, Beijing, China.
336. **Xin, H.** 1996. Responses of neonatal chicks to post-hatch holding environment. The 1<sup>st</sup> International Conference on Agricultural and Biological Environmental Engineering, Aug. 15-19, 1996, Beijing, China.
337. **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.
338. **Xin, H.** 1995. A computerized measurement and data acquisition system for field poultry research. The 4<sup>th</sup> Latin America Conference on Agromatics, April 24-28, 1995, the Institute of Technology of Costa Rica, San Carlos, Costa Rica.
339. **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: 240+****Extension Publications and Popular Press Articles Derived from Research**

1. 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.
2. 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.
3. 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.
4. 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.
5. 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.
6. **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.
7. **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, in Raleigh, NC.
8. **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.
9. Burns, R.T., R. Swestka, **H. Xin**, et al. 2008. Development of a wireless sensor network to quantify spatial and temporal H<sub>2</sub>S concentrations in swine houses (A Progress Report) Animal Industry Report. A.S. Leaflet R2436. Iowa State University Extension, Ames, IA.
10. 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.
11. 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 University Extension, Ames, IA.
12. 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.
13. 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.
14. 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.
15. **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.
16. **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.
17. Xin, H. 2005. Instruments for measuring concentrations and emission rates of gases and particulates from animal feeding operations. PM 1990, Iowa State University Extension
18. 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.

19. 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.
20. 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.
21. 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.
22. 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.
23. Li, H., **H. Xin**, and Y. Liang. 2004. Indirect Measurement of Building Ventilation Rate for Manure-belt Laying Hen House Using CO<sub>2</sub> Balance. College of Agriculture Research Report, ASL # 520, Iowa State University.
24. **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.
25. **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.
26. Researcher offers study on cooling poultry houses. *Poultry Times*, March 20, 2000: 16.
27. **Xin, H.** 2000. Sprinkling and fogging can help cool laying hens. *Poultry Times*, April 17, 2000: 3 & 13.
28. **Xin, H.** 1999. Nutrient profile, manure production of layers. *Poultry Times – Supplement*. April 19, 1999: 2A.
29. Keeping wean-to-finish trouble free. *Pork'99/July*: 25.
30. **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.
31. **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.
32. **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.
33. 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.
34. Nutrients aid chick growth in overseas shipments. 1999. *Poultry Times*, July 26: 16.
35. High-rise layer house manure volume and nutrient control. 1998. *Egg Industry*, August 1998: 10.
36. Iowa researchers find disparity in state manure estimates. 1998. *Poultry Times*, Sept 7, 1998:12
37. **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.
38. **Xin, H.** 1998. Old litter brooding for broilers needs proper ventilation. *Poultry Times*, October 19.
39. **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.
40. **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.
41. 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.
42. Energy savings in swine production – Iowa Energy Success Story. 1998. *Watt Savers*: 2-7.
43. Porcine computerized comfort. 1998. *Visions Winter 1998*: 7.
44. **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.

45. **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.
46. Computer would measure pigs' comfort. 1997. *Kearney (Neb) Daily Hub*. July 16, 1997.
47. Computer helps keep pigs comfy. 1997. *Capper's*. September 9, 1997.
48. It's a pig's life. 1997. *The Harold Journal, Logan, Utah*.
49. Little pigs, are you comfortable. 1997. *Waukesha Freeman*. July 15, 1997.
50. Little pigs, are you comfortable. 1997. *Boone County Ag Life*. July 8, 1997.
51. Wallowing in comfort. 1997. *Waterloo-Cedar Falls Courier*. July 7, 1997.
52. **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.
53. 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.
54. 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.
55. 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.
56. 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.
57. **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.
58. **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.
59. Harmon, J.D. and **H. Xin**. 1995. Environmental guidelines for confinement swine housing. Pm-1586a. Iowa State University, Ames, Iowa.
60. Harmon, J.D. and **H. Xin**. 1995. Choosing fans for livestock and poultry ventilation. Pm-1587. Iowa State University, Ames, Iowa.
61. **Xin, H.** and V.J. McFadden. 1995. Tunnel ventilation to alleviate animal heat stress. Pm-1606. Iowa State University, Ames, Iowa.
62. Harmon, J.D. and **H. Xin**. 1994. Health hazards in swine confinement housing: How bad is bad? AEN-156. Iowa State University, Ames, Iowa.
63. Harmon, J.D., R. Zhang, and **H. Xin**. 1994. Human health concerns in livestock and poultry housing. AEN-157. Iowa State University, Ames, Iowa.
64. **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 **\$21,521,700** contracts and grants in competitive research, extension and education programs. Listed below are collaborating colleagues at ISU and other institutions.

<b>Name</b>	<b>Position</b>	<b>Department/Affiliation</b>
Ahn Dong U.	Professor	AnSci
Beck, Mary M.	Professor and Dept. Head	Mississippi State Univ.
Benson, Eric	Associate Professor	University of Delaware
Bregendahl, Kristjan	Assistant Professor	AnSci (now Sparboe Company)
Brown-Brandl, Tami	Biological Engineer	USDA-ARS-MARC
Burns, Robert T.	Professor and Assistant Dean	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
Gregory, Chad	Senior Vice President	United Egg Producers
Halbur, Patrick G.	Professor and Dept Chair	Vet Med
Harmon, Jay D.	Professor	ABE
Harris, Dilbert (Hank) L.	Professor	Animal Science
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	Economics
Koziel, Jacek	Associate Professor	ABE
Koelkebeck, Ken	Professor	University of Illinois
Li, Hong	Assistant Professor	University of Delaware
Mench, Joy	Professor	UC-Davis
Lorimor, Jeffery C.	Associate Professor (retired)	ABE
Mickelson, Steve	Professor & Chair	ABE
Millman, Suzanne	Associate Professor	VDPAM
Noll, Sally	Professor	University of Minnesota
Patience, John	Professor	AnSci
Persia, Michael E.	Assistant Professor	AnSci (now at VPI)
Powers, Wendy	Professor	AnSci (now at MSU)
Patterson, Paul	Professor	The Penn State University
Richard, Tom	Professor	ABE (now at PSU)
Reynnells, Richard D.	National Program Leader	USDA, Washington D.C.
Robin, Paul	Senior Researcher	INRA UMR SAS, France
Sell, Jerry L.	Distinguished Professor (retired)	AnSci
Stewart, Brian	Professor	ABE
Swanson, Janice	Professor	Michigan State University
Tao, Yang	Professor	University of Maryland
Tang, Lie	Associate Professor	ABE
Trampel, Darrell W.	Professor	Vet Diag. & Prod Ani. Med.

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

<b>Name</b>	<b>Position</b>	<b>Department/Affiliation</b>
Udpa, Lalita	Professor	ECpE (now at MSU)
Venkitanarayanan, Kumar	Professor	University of Connecticut
Wang, Tong	Professor	Food Sci. & Human Nutrition
Wesley, Irene	Research Scientist (retired 2011)	Nat'l Animal Disease Center
Wheeler, Eileen F.	Professor	The Penn State University
Zhang, Qiang	Professor	University of Manitoba, Canada
Zhang, Ruihong	Professor	UC-Davis

**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
FIPSE-DOE:	Funds for Improvement of Post-Secondary Education, U.S. Department of Education
HLI:	Heartland Lysine, Inc., Chicago, IL
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):*

<b>Project Title</b>	<b>Grantor</b>	<b>PI</b>	<b>Co-PI</b>	<b>Period</b>	<b>Amount</b>
An innovative system to improve environment and productivity of aviary hen housing	USDA-NIFA	<b>Xin</b>	Zhao, Wang, Millman, Soupir	10/01/14 – 09/30/17	\$500,000
Continued sponsorship of EIC's industry monthly reports and economic analysis	AEB	<b>Xin</b>	Ibarburu	01/01/15 – 12/31/15	\$78,000
Comparison of environmental footprint of U.S. eggs vs. other plant and animal sources	AEB	<b>Xin</b>	Ibarburu, Pelletier, Wang	02/25/14 – 02/24/15	\$75,048
The Egg Industry Center economic analysis and newsletter services	AEB	<b>Xin</b>	Ibarburu	01/01/14 – 12/31/14	\$78,000
Evaluation of LED lighting in aviary hen housing	IPRT and ICF	<b>Xin</b>	Wang, Zhao	07/01/13 – 06/30/14	\$50,449
The Egg Industry Center economic analysis and newsletter services	AEB	<b>Xin</b>	Ibarburu	01/01/13 – 12/31/13	\$75,200
Evaluation of transportation conditions on performance of weaned and feeder pigs	NPB	Harmon	<b>Xin</b> , Hoff, Baas	07/01/13 – 06/30/14	\$47,196
Quantification of greenhouse gas emissions from a Midwestern swine breeding/farrowing /gestation facility	IPPA	<b>Xin</b>	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	<b>Xin</b> et al.	10/01/12 – 09/30/15	\$483,464
Comparing heat lamp vs. heat mat for farrowing crate heating	IPPA	<b>Xin</b>	Stinn	08/01/12 – 12/31/13	\$16,914
A comparative assessment of environmental footprint of the U.S. egg production supply chains between 1960 and 2010	AEB, USPEA, UEA	<b>Xin</b>	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	<b>Xin</b>	Brehm-Stecher, Ibarburu-Blanc, Li, Millman, Tang, 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 (MSU) Mench (UCD), <b>Xin</b> (ISU), Jones (USDA-ARS)	~ 20 scientists at MSU, UCD and USDA-ARS	10/01/10 – 09/30/14	\$6,000,000 (Xin 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)	<b>Xin</b> , Alphin (UD), Johnson (UPenn), Persia	10/01/10 – 09/30/12	\$238,500
Sustaining Iowa pork production and air quality	IPPA	<b>Xin</b>	Colletti	09/01/10 – 08/31/13	\$57,000



*Funded Research Grants/Contracts (in chronological order):*

<b>Project Title</b>	<b>Grantor</b>	<b>PI</b>	<b>Co-PI</b>	<b>Period</b>	<b>Amount</b>
Development of monitoring methods for quantifying greenhouse gas emissions reduction through use of biogas digesters for livestock manures in China	US EPA	Dong	Zhu, <b>Xin</b>	10/01/10 – 09/30/13	\$372,750
Reducing egg-borne outbreaks of Salmonella Enteritidis by integrating research and extension	USDA-NIFA	Venkitanarayanan	Darre, <b>Xin</b> , Curtis, Patterson	09/01/10 – 08/31/14	\$598,551 Xin share: \$51,881
Donation of National Air Emissions Monitoring Study (NAEMS) equipment to Egg Industry Center (Gift in Kind)	AEB	<b>Xin</b>		07/01/10	\$ 596,945
Quantification of greenhouse gas emissions from a Midwestern swine breeding/farrowing /gestation facility	IPPA	<b>Xin</b>	Burns, Patience	08/01/10 – 07/31/12	\$135,474
Midwest Poultry Research Program	USDA-NIFA Special Grant	<b>Xin</b>	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 (supplemental funding)	IEC	<b>Xin</b>	Li, Ibarburu, Millman, Brehm-Stecher, Hayes,Swanson	04/01/10 – 08/31/11	\$30,000
Sponsorship of Egg Industry Issues Forum	AEB	<b>Xin</b>		03/01/10 – 09/01/10	\$30,000
Cash match funding for the USDA NRCS CIG Project – Part 2	UEP	<b>Xin</b>	Li	01/01/10 – 08/31/10	\$50,000
Characterizing the carbon footprint of U.S. egg production using life cycle assessment	AEB	<b>Xin</b>	Ibarburu, Pelletier	01/01/10 – 12/31/10	\$46,485
Effects of long-term supplementation of laying-hen diets with high concentrations of cholecalciferol on egg yolk Vitamin D concentration, egg quality, hen performance and hen health	AEB & IEC	<b>Persia</b>	Wang, <b>Xin</b> , Lamont, Beitz	01/01/10 – 12/31/11	\$119,103
Ammonia emissions of pullets and laying hens as affected by stocking density – Yr 2	IEC	<b>Xin</b>	Li, Mendes	07/01/09 – 06/30/10	\$46,132
Evaluation of different diets on ammonia emission and production performance of laying hens	IEC	<b>Xin</b>	Chepete, Li	07/01/09 – 06/30/10	\$43,670
Impacts of feeding DDGS to swine: aerial emissions and potential management strategies	IPPA	Burns	<b>Xin</b> , Swestka	07/01/09 – 10/31/10	\$107,347
Midwest Poultry Research Program	USDA- CSREES Special Grant	<b>Xin</b>	Wang, Reitmeier	08/01/09 – 07/31/10	\$439,107
Midwest Poultry Research Program	USDA- CSREES Special Grant	<b>Xin</b>	Ahn	09/01/08 – 08/31/09	\$389,947

*Funded Research Grants/Contracts (in chronological order):*

<b>Project Title</b>	<b>Grantor</b>	<b>PI</b>	<b>Co-PI</b>	<b>Period</b>	<b>Amount</b>
Updating heat and moisture production rates of modern swine and their housing systems	ASHRAE	Brown-Brandl	<b>Xin</b>	04/01/09 – 05/30/12	\$180,000 Xin share: \$64,441
Ammonia emissions of pullets and laying hens as affected by stocking density	IEC	<b>Xin</b>	Li, Mendes	07/01/08 – 06/30/09	\$43,419
Assessing hen response to ammonia and thermal comfort combinations via preference test	IEC	<b>Xin</b>	Li, Hayes	07/01/08 – 06/30/09	\$49,033
Hydrogen sulfide spatial distribution and worker exposure in swine houses	IPPA	Burns	Keren, <b>Xin</b> , 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	<b>Xin</b>	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)	<b>Xin</b>	Gregory, Burns, Gates Bregendahl, Kliebenstein, Wheeler, Patterson	10/01/07 – 03/31/10	\$812,998 Xin share: \$432,030
Cash match funding for the USDA NRCS CIG Project	UEP	<b>Xin</b>	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	<b>Xin</b>	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	<b>Xin</b>	Burns, Jacobson, Harmon, Hoff, Noll	03/01/07 – 02/28/09	\$499,933
Determining ammonia and particulate matter emissions from Midwest turkey houses	Iowa Turkey Federation	<b>Xin</b>	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	<b>Xin</b> , Hoff, Moody, Muhlbauer	03/01/07 – 02/28/08	\$48,389
Reference procedures to measure polluting emissions from livestock buildings and storage to air	ADEME (French Environment and Energy Agency)	Robin	<b>Xin</b> et al. (14 international institutions)	01/01/07 – 02/28/09	€1,040,741 (\$1,352,963) Xin share: €34,222
Field verification of ammonia emission mitigation strategies from layer houses	USPEA	<b>Xin</b>	Burns, Wheeler, Patterson, Gates	03/01/07 – 02/28/08	\$70,436

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<b>Project Title</b>	<b>Grantor</b>	<b>PI</b>	<b>Co-PI</b>	<b>Period</b>	<b>Amount</b>
Development of a producer-oriented portable tool for measurement of ammonia emission from high-rise house or manure storage	IEC	<b>Xin</b>		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	<b>Xin, Roberts</b>	01/01/07 – 12/31/08	\$40,000
Laying hen manure characteristics and air emissions as affected by genetic strains	MPRP & Hy-Line	<b>Xin</b>	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	<b>Xin</b>	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	<b>Xin</b>	01/01/06 – 12/31/06	\$16,255
Partial funding to support acquisition of a thermal desorption system for AFO air quality research	IEC	Koziel	<b>Xin</b>	07/01/06 – 12/31/06	\$10,000
Comparative evaluation of a new heat lamp fixture and controller	Retrolite of America, Inc.	<b>Xin</b>		12/01/05 – 12/31/05	\$5,800
A systematic evaluation of laying hen housing schemes intended to improve bird welfare	IEC	<b>Xin</b>	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	<b>Xin, Fadel (UCD), Ogejo (VPI) &amp; Heber</b>	01/01/06 – 12/31/07	\$496,643 Xin 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	<b>Xin, Gates, Hoff</b>	10/01/05 – 09/30/07	\$648,231
Characterization and mitigation of ammonia and odor emissions from laying hen manure storage and composting	Midwest Poultry Consortium	<b>Xin</b>	Wang, Koziel, Koelkebeck	04/1/05 – 03/31/06	\$53,859
Measurement of ammonia emission rate from broiler production houses	Tyson Foods	Burns	<b>Xin</b>	03/28/05 – 09/28/06	\$399,525
Mitigating ammonia emissions from egg production facilities	Iowa Egg Council	<b>Xin</b>		12/1/04 – 11/30/07	\$100,000
Mitigation of ammonia emissions from layer manure storage	US PEA	<b>Xin</b>	Wang, Liang,	10/1/04 – 09/30/05	\$54,579

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<b>Project Title</b>	<b>Grantor</b>	<b>PI</b>	<b>Co-PI</b>	<b>Period</b>	<b>Amount</b>
Mitigation of ammonia emissions from layer operations by bio/chemical treatment of manure	ISU-AES	<b>Xin</b>	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, <b>Xin</b> , et al.	07/1/04 – 03/31/05	\$250,000 Xin share: \$30,000
Effects of stack surface to volume ratio and air exchange rate on ammonia Emission of Laying Hen Manure Storage	IEC & IPRT	<b>Xin</b>	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, <b>Xin</b> , 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	<b>Xin</b>	06/01/04 – 05/31/05	\$44,609 Xin 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	<b>Xin</b> , 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	<b>Xin</b>	09/01/03 – 08/31/08	\$207,000 Xin 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	<b>Xin</b> , Russell, Kerr	03/01/04 – 02/28/05	\$51,739
ABE Air Quality Initiative – development of sampling system for downwind emission measurement	IPPA	Hoff	<b>Xin</b> , Bundy, Harmon	07/01/03 – 06/30/04	\$100,000
Determining dynamic CO <sub>2</sub> release profiles of CO <sub>2</sub> Pak™	CO <sub>2</sub> Technology & CATD	<b>Xin</b>	Wang	01/01/03 – 3/31/03	\$18,090
Lab evaluation and field verification of Single Point Monitors (SPM's) for measuring aerial ammonia and hydrogen sulfide associated with swine operations	NPB	<b>Xin</b>	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, <b>Xin</b>	7/1/02 – 6/30/03	\$25,500
Reducing ammonia emissions from poultry houses by enhanced manure and diet management	USDA – IFAFS Program	Gates	<b>Xin</b> , Wheeler	10/01/01 – 09/30/03	\$873,754 Xin share: \$227,960
Improving measurement of emissions from poultry houses	6-SCAWM	<b>Xin</b>	Heber	10/01/01 – 09/30/02	\$163,344 Xin share: \$67,625
Establishment of baseline data on aerial ammonia concentration and emission rate in Iowa pullet and layer houses	IEC & CATD	<b>Xin</b>	Gates	05/01/01 – 04/30/02	\$53,170

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<b>Project Title</b>	<b>Grantor</b>	<b>PI</b>	<b>Co-PI</b>	<b>Period</b>	<b>Amount</b>
Optimizing partial surface wetting to cool caged layers	USPEA	<b>Xin</b>	Gates, Dixon	07/01/01 – 06/30/02	\$52,279
Poultry environment research (gift)	HLI	<b>Xin</b>		2001	\$15,000
Cooling cage laying hens by partial surface wetting	USPEA	<b>Xin</b>	Gates, Dixon, Beck	07/01/00 – 06/30/01	\$24,000
Evaluation of drinking water temperature on laying hen performance	IEC	<b>Xin</b>	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	<b>Xin</b>		06/16/00 – 08/06/01	\$8,300
Quantification of feeding and drinking behaviors of poultry for enhanced animal well-being	USDA-NRI	Gates	<b>Xin</b>	09/01/00 – 08/31/01	\$150,709
Minimizing ammonia loss to the atmosphere from high-rise layer facilities	IEC	Lorimor	<b>Xin</b>	06/01/00 – 05/31/01	\$29,050
Use of infrared imaging (IRI) to improve detection of disease in pigs	ILHAC	Halbur	<b>Xin</b>	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, <b>Xin</b>	10/01/00 – 09/30/01	\$50,000
Effects of heat lamp usage on performance of piglets shortly after birth	AFRDI	Zhang	<b>Xin</b>	01/01/00 – 12/31/01	\$48,000
Updating heat and moisture production rates of poultry and their housing systems	ASHEAE	<b>Xin</b>		04/01/99 – 03/31/01	\$124,572
Evaluation and demonstration of livestock waste pollution reduction strategies and practices	USDA-FAS	<b>Xin</b>	Lorimor, Dong	02/01/99 – 01/31/02	\$30,000
Effects of fluctuating temperatures on PIC Isowean pigs	PIC	<b>Xin</b>	Ewan, Harmon, Harris	01/01/99 – 05/31/99	\$28,576
Development of a real time behavior-based swine comfort controller	NPPC	<b>Xin</b>		07/01/99 – 06/30/00	\$18,500
Infrared imaging for on-line, non-contact doneness inspection of chicken meat	USDA-NRI	Tao	<b>Xin</b>	10/01/99 – 03/31/02	\$125,000
Economic evaluation of wean-to-finish production systems	IPPA	Baas	Harmon, <b>Xin</b>	04/01/99 – 03/31/00	\$23,260

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<b>Project Title</b>	<b>Grantor</b>	<b>PI</b>	<b>Co-PI</b>	<b>Period</b>	<b>Amount</b>
Performance evaluation of heat mats in swine farrowing facilities	MAAS	Zhang (UM, Canada)	<b>Xin</b>	09/01/98 – 08/31/99	\$20,800
Environmental impact of the use of poultry manure for agriculture production	IEC, Leopold Center	Kanwar	Lorimor, <b>Xin</b>	07/01/98 – 06/31/04	\$145,100
Environment control for livestock and poultry production	MOA, BFE	Dong	<b>Xin</b>	01/01/98 – 12/31/05	\$150,000+
A novel environmental controller to maximize swine thermal comfort	CATD	<b>Xin</b>		04/01/98 – 12/31/98	\$11,000
Responses of PIC isowean pigs to simulated overseas transportation conditions	PIC	<b>Xin</b>	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	<b>Xin</b>		04/01/98 – 06/30/99	\$33,492
Quantification of postural behavior as thermal comfort indicator to pigs	NPPC	<b>Xin</b>		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	<b>Xin</b>	Gates	04/01/98 – 03/31/00	\$78,650
Biophysical models for poultry production system	NE127	<b>Xin</b>		10/01/98 – 06/30/05	\$62,000
Image analysis of swine postural behavior to improve thermal comfort	IPPA	<b>Xin</b>	Udpa	07/01/97 – 06/30/98	\$18,000
Reciprocal visit by Dr. Hongmin Dong of CAAS for training in swine & poultry environment	ISU-DAIRG	<b>Xin</b>		01/01/98 – 08/31/98	\$1,500
Heat and moisture production of tom turkeys during brooding-growth period	ITF	<b>Xin</b>	Sell	07/01/97 – 12/31/97	\$4,729
Efficacy of Novus 1027™ as an in-transit nourishment for chicks	NII	<b>Xin</b>	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, <b>Xin</b>	07/01/97 – 06/30/99	\$45,074

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<b>Project Title</b>	<b>Grantor</b>	<b>PI</b>	<b>Co-PI</b>	<b>Period</b>	<b>Amount</b>
Alleviating in-transit chick mortality and weight loss via supply of pre-shipment nourishment and improved microenvironment	USPEA	<b>Xin</b>	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	<b>Xin</b>	Sell	05/01/96 – 04/30/97	\$40,268
Determination of high-rise layer house manure volume and nutrient content	USPEA	<b>Xin</b>	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	<b>Harmon</b>	Hoff, Xin	04/01/96 – 03/31/97	\$13,400
A novel environmental controller to maximize swine thermal comfort	ISU-SPRIG	<b>Xin</b>	Udpa	01/01/97 – 12/31/97	\$7,886
Environment control for livestock and poultry production	MOA, BFE	Dong	<b>Xin</b>	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, <b>Xin</b>	07/01/96 – 12/31/96	\$2,400
Development of LIFE (Livestock Industry, Facilities and Environment) Educational Series	ISU – Office of VP for Extension	Glanville	Harmon, Lorimor, <b>Xin</b>	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	<b>Xin</b>	Bundy	07/01/94 – 06/30/98	\$159,754
Procurement of a state-of-the-art infrared thermal imaging camera	Iowa Energy Center	<b>Xin</b>		07/97	\$11,000
Alleviating long-journey chick stress and subsequent mortality via improved design and microenvironment of transport containers	Hy-Line International	<b>Xin</b>		07/01/94 – 06/30/96	\$31,957
An innovative chick shipping container	CATD	<b>Xin</b>		09/01/95 – 03/31/96	\$14,142
Training of a Russian scholar in animal production systems	RSCHE	<b>Xin</b>		01/05/95 – 12/09/95	\$19,743
Biophysical models for poultry production system	NE127	<b>Xin</b>		10/01/94 – 09/30/98	\$25,000
Development of an animal environment research laboratory (gift)	Agri-Tech, Inc.	<b>Xin</b>		1994	\$5,040
Responses of poultry to environmental control schemes in cold climates	ISU-COE	<b>Xin</b>		01/17/94 – 05/31/94	\$4,000
Monitoring turkey house air quality in southeast Iowa	ITMC	<b>Xin</b>	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 <sup>\$</sup>	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 <sup>@</sup>	M.S.	Evaluation of intermittent partial surface wetting to relieve laying hens of heat stress	S/G	Jun 97	May 99
Cook, Rachel <sup>+,%</sup>	M.S.	Effect of cage stocking density on feeding behavior of laying hens	C/G	Aug 03	June 05
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 <sup>*</sup>	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 under 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 <sup>%</sup>	M.S.	Feeding behaviors of pullets and laying hens with or with beak-trimming	C/G	Aug 01	May 03
Yang, Peilin <sup>&amp;</sup>	M.S.	Nitrogen loss from laying hen manure in high-rise layer houses	G	Jun 97	Dec 99
Ye, Wenyu	M.S.	Quantifying thermal comfort behavior of young pigs using thermography	G	Jan 98	Aug 99
Andersen, Heidi	Ph.D. (visiting student)	Automatic climate control of swine houses	S	Sept 05	Dec 05
Chepete, Justin H. <sup>***</sup>	Ph.D.	Determination of heat and moisture production rates of modern poultry and housing systems	G	Aug 99	May 02
Davis, Jeremiah <sup>++,%</sup>	Ph.D.	Monitoring cattle locomotion and ingestion behavior via remote sensing	C/G	Jan 04	Jun 07
Ehr, Isa	Ph.D.	Impact of nutritional strategies on poultry	G	Jan 13	
Green, A.R. <sup>%</sup>	Ph.D.	A systematic evaluation of laying-hen housing systems for improved hen welfare	NSF Fellow/G	Aug 04	Jan 08

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

Name	Degree/ Position	Thesis Title or Area of Training	Support <sup>\$</sup>	Start	Finish
Hayes, M.D. <sup>§</sup>	Ph.D.	Alternative housing systems for laying hens	G	Aug 08	May 12
Li, Hong <sup>++</sup>	Ph.D.	Ammonia emissions from manure belt laying hen houses and manure storage	G	Aug 02	May 06
Liu, Kai	Ph.D.	Alternative housing for laying hens	CSC/G	Aug 12	
Ma, He	Ph.D.	Responses of poultry to lighting	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 <sup>**</sup>	Ph.D.	Quantification of thermal needs of young pigs by image analysis of postural behavior	D/G	Aug 94	Dec 97
Stinn, John <sup>%%</sup>	Ph.D.	Quantification of greenhouse gas emissions from breeding, gestation and farrowing swine facilities	G	Aug 10	Aug 14
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 <sup>*</sup>	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
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

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

<b>Name</b>	<b>Degree/ Position</b>	<b>Thesis Title or Area of Training</b>	<b>Support<sup>\$</sup></b>	<b>Start</b>	<b>Finish</b>
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	
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 (esp. poultry) 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
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
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

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

<b>Name</b>	<b>Degree/ Position</b>	<b>Thesis Title or Area of Training</b>	<b>Support<sup>\$</sup></b>	<b>Start</b>	<b>Finish</b>
Tang, Xiangfang	Visiting Researcher	Bioenergetics, air quality and animal- environment interactions	G	April 10	Sept 10
Verhoijesen, Wilco	Visiting Researcher	Poultry production systems, environment control, and animal welfare	S	Aug 14	Dec 14
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

<sup>\$</sup> 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. Justin H. Chepete (M.S., 1999; PhD, 2002), Professor and Head, Department of Agricultural and Biosystems Engineering, Botswana University of Agriculture, Gaborone, Botswana
- Dr. Jeremiah Davis (PhD, 2007), Associate Professor, Department of Agricultural and Biological Engineering, Mississippi State University, Starkville, MS
- Dr. Hongmin Dong (Visiting Researcher, 1998), Professor and Deputy Director General, Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Agricultural Sciences, 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), Clinical Assistant Professor, Department of Agricultural and Biological Engineering, University of Illinois, Urbana-Champaign, IL
- 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. 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
- 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, Akey Poultry Nutrition Center, Lewisburg, 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 4<sup>th</sup> 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, Chinese Academy of Ag Sciences, 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. Zhiping Zhu (PhD – sandwich program, 2006), Associate Professor, Institute of Environment and Sustainable Development in Agriculture, Chinese Academy of Ag Sciences, Beijing, China

## EXTENSION/OUTREACH PROGRAMS

### **a. Leadership with the Egg Industry Center**

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 14-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 raise \$10 million of private funding to establish an endowment to support its programs. To date, over \$6 million has been raised. EIC is serving the egg industry, academia, government and the general public by:

- Conducting issue-oriented research projects (e.g. 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 approximately 1,000 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; India polis, 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 1,000 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. Leading ABE Extension Program to Serve the Poultry Industry**

Dr. Xin leads 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, and University of Illinois), allied industry representatives, producer representatives, and government agency (USDA). As a result of the ESP's

collective effort, a USDA-CIG demonstration project recently completed (2010) in Iowa and Pennsylvania demonstrate 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 is expected to be adopted by increasing number of 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 about 60 extension publications, media reports and popular press articles

## SERVICE ACTIVITIES

### a. University, College and Departmental Committees Served

- Search Committee for the ISU Vice President for Research (Sept 2013–Dec 2013)
- University Graduate Faculty Term Membership Review Committee (2003–2006)
- College of Agriculture and Life Sciences (CALS) Air Quality Issue Team (2003–present)
- CALS Avian Influenza Issue Team (2006–2010)
- CALS Diversity Committee (1997–2001; 2009–2010; 2010–2011)
- CALS Promotion and Tenure Advisory Committee (2003–2006)
- College of Engineering Committee on Research Strategy (2012 – present)
- 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 – present)
- College of Engineering Honors and Awards Committee (2004–2007; 2007 – 2010)
- ABE ad-hoc faculty search committees (2003-2004)
- 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)
- 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– present)
- ABE Professional Development and Awards Committee (1997–present, 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)

**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–present)
- Co-chair of International Symposium on Animal Environment and Welfare sponsored by IRCAEW, October 19–22, 2013, Chongqing, China
- Member of the United Egg Producers 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) 2008–2010, 2011–2013, 2013–2015)
- Member of the USDA-NRI Air Quality Program Review Panel (2007)

***ASABE (American Society of Agricultural and Biological Engineers):***

- Planning Committee for the 9<sup>th</sup> International Livestock Environment Symposium (2010 – 2012)
- Program Chair of the 8<sup>th</sup> International Livestock Environment Symposium (2006 – 2008)
- Planning Committee Member and Local Host Co-chair for 7<sup>th</sup> 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/Rongchang, Sichuan, 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, 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**

<b>Name</b>	<b>Degree Sought</b>	<b>Department</b>	<b>Duration</b>
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 –
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 –
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
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 area of animal production environment and animal welfare. The collaboration has been in the forms of conducting educational workshops at CAAS and CAU, reciprocal visits/exchange of faculty, joint training of CAAS and CAU graduate students – especially PhD students (both 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 publications in international journals. A special accomplishment of the collaboration with CAAS is establishment of a China-US Agro-environmental Center of Excellence (CUACE) based at CAAS in Beijing since 2002. Sponsored by the USDA-FAS, Dr. Xin played a key role in the establishment of CUACE. The Center, the first of its kind in China, has been serving as the clearinghouse and think-tank for developing national policies and plans on environmental issues and sustainable animal production systems in China. Working closely with Dr. Hongmin Dong, professor, Director of the Center and Deputy Director of the Institute, Dr. Xin has been instrumental to the development and implementation of the Center's mission and goals. A recent example of the collaborative research 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 an 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 a total of 2-4 weeks at CAAS and CAU, conducting academic exchange and technical advice. To date, Dr. Xin has participated in/contributed to advising of more than 30 graduate students at CAAS and CAU.
- Since 1998 Dr. Xin has been conducting academic collaboration and capacity building with two Brazilian universities, Federal University of Vicosa (UFV) and the Federal University of Lavras (UFL) in the areas of animal production environment and animal welfare. Once again, the collaboration takes the forms of educational workshops at UFV and UFL, reciprocal visits/exchange of faculty, joint training of Brazilian undergraduate and graduate students (both in Brazil and at ISU), joint research and educational projects funded by US and Brazilian agencies, and 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 serves 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. The feedbacks from both ISU and Brazilian students were extremely positive. A new FIPSE-CAPES project has been awarded (2009), allowing the successful academic exchange/collaborations to continue. Dr. Brian Steward serves 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. 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 and colleagues played a key role in establishing the International Research Center for Animal Environment and Welfare headquartered in Rongchang, Chongqing. 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 to enhance 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 the mankind. Current participating institutions include: Iowa State University, University of Manitoba (Canada), University of Illinois at Urbana-Champaign; Purdue University, University of Missouri, University of Southern Queensland (Australia, through the National Centre for Engineering in Agriculture); Wageningen University and Research Center (The Netherlands), Aarhus University (Denmark); University of Tennessee, Catholic University of Leuven (Belgium), University of Campinas (Brazil), The Ohio State University, China Agricultural University; Northeastern Agricultural University; Nanjing Agricultural University, and Chongqing Academy of Animal Sciences. More institutions or organizations are expected to join in the Center membership subject to approval by the Board of Directors (BOD). 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. An International Symposium on Animal Environment and Welfare (ISAEW2011) was held in October 2011, an educational workshop on the same topic held in November 2012, ISAEW2013 held in October 2013, and another workshop held in September 2014. Working with local hosts, Dr. Xin was responsible for organizing and coordinating the symposia and workshops. He served as the co-chair of the 2001 and 2013 Symposia, and will do so for ISAEW2015 to be held in October 2015.

#### **Research Collaborations with Prominent International Institutions**

- 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.
- Since 2000 Dr. Xin has 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 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.
- Since the late 90's Dr. Xin has been collaborating with Professor Daniel Berckmans at the Catholic University of Leuven (KUL), Belgium in quantification and modeling of physiological, energetic and behavioral responses of animals to biophysical factors, and recently on precision livestock farming (PLF). Students and faculty exchanges between ISU and KUL have taken place; and special symposia have been held.
- Dr. Xin has conducted collaborative research with the National Institute of Animal Industry of Japan (Dr. Atsuo Ikeguchi) 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 and 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 is conducting research in Dr. Xin's lab (Nov 2013 – Nov 2014).

**International Reputation and Honors**

- Since 1994 Dr. Xin has delivered more than 40 invited talks at international conferences or symposia in Belgium, Brazil, China, Columbia, Costa Rica, Denmark, France, Italy, Japan, Spain, The Netherlands, and the United Kingdom.
- 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.
- Appointed to the Scientific Advisory Committee for the Science and Information Centre for Sustainable Poultry Industry [Wissenschafts-und Informationszentrum Nachhaltige Geflügelwirtschaft (WING)], Raum, Germany (2013– )
- 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)
- 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)
- Co-chair of the International Symposium on Animal Environment and Welfare, Oct 20-22, 2013; Rongchang, Chongqing, China.
- Keynote presentation on “*Environmental control for poultry production*” at 16<sup>th</sup> 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, held in Salvador, Brazil, August 5-9, 2012.
- Keynote speaker on “*Toward standardization of data collection, analysis and presentation of AFO air emissions*” at the Ninth International Livestock Environment Symposium held in Valencia, Spain, July 9-12, 2012.
- Member of Planning Committee for the Ninth International Livestock and Environment Symposium (ILES IX) held in Valencia, Spain, July 8-12, 2012
- 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 to be held September 5-9, 2016 in Beijing, China (2012– )
- 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, held in Rongchang/Chongqing, Sichuan Province, China, October 20-22, 2011.
- 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*” held in Chongqing, China, Oct 22-25, 2009
- External examiner for a PhD dissertation of University of Kwazulu-Natal, South Africa (Sept 2009)
- Program Chair of the Eighth International Livestock and Environment Symposium (ILES VIII) held in Iguassu Falls, Brazil, Sept 1-4, 2008
- 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) held in Beijing, China, May 18-21, 2005
- 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, since 2010)
- *AE/TSM 601 – Seminar* (co-teaching with Dr. Ramesh Kanwar), Fall 2007, 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 U.S. poultry production systems, since 2009)
- *AE409 – Engineering quantification of biological processes* (guest lectures)
- 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 (LEAP) Research Laboratory I
- Livestock Environment and Animal Physiology (LEAP) Research Laboratory II
- Bio-imaging and Measurement Laboratory
- Four mobile laboratories for measurement of air emissions from animal feeding operations