

# Chong Wang

---

Chong Wang  
2239 Lloyd Vet Med Ctr  
Iowa State University  
Ames, Iowa 50011

Phone: (515) 294-3836  
Fax: (515) 294-1072  
chwang@iastate.edu

## EDUCATION

---

Ph.D. **Statistics**, with minor in **Epidemiology**, [Cornell University](#), Ithaca, NY, 08/2006

**Dissertation:** ROC Analysis for Cross-Sectional and Longitudinal Disease Diagnostic Data without a Gold Standard Test: Application to Johne's Disease in Dairy Cows  
Advisor: [Bruce W. Turnbull](#)

M.S. **Statistics**, Cornell University, Ithaca, NY, 12/2004

B.S. **Statistics and Probability**, [Peking University](#), Beijing, P.R. China, 07/2001

## EMPLOYMENT

---

01/2009 – present	Assistant Professor, Department of Veterinary Diagnostic and Production Animal Medicine, Iowa State University
01/2009 – present	Assistant Professor, Department of Statistics, Iowa State University
08/2007 – 12/2008	Assistant Professor, Department of Biostatistics, University of Kentucky
08/2007 – 12/2008	Assistant Professor, Department of Statistics, University of Kentucky
08/2006 – 05/2007	Visiting Assistant Professor, Department of Mathematics, Cornell University
08/2006 – 07/2007	Postdoctoral Associate with <a href="#">Yrjö T. Gröhn</a> , Department of Population Medicine and Diagnostic Sciences, College of Veterinary Medicine, Cornell University

## RESEARCH INTERESTS

---

- Biostatistics and Epidemiology
- Diagnostic Test Evaluation
- Bayesian Statistical Modeling
- Longitudinal Data Analysis
- Bioinformatics
- Development and Application of Statistical Methods in Veterinary Medicine

## RESEARCH PAPERS in PEER-REVIEWED JOURNALS

1. **Wang, C.**, Turnbull, B. W., Nielsen, S. S. and Gröhn, Y. T., (2011). Bayesian analysis of longitudinal Johne's disease diagnostic data without a gold standard test. *Journal of Dairy Science*, 94: 2320-2328. [DOI: 10.3168/jds.2010-3675](https://doi.org/10.3168/jds.2010-3675)
2. Liu, Z., Ramer-Tait, A. E., Henderson, A. L., Demirkale, C. Y., Nettleton, D., **Wang, C.**, Hostetter, J. M., Jergens, A. E., Wannemuehler, M. J. (2011). *Helicobacter bilis* colonization enhances susceptibility to typhlocolitis following an inflammatory trigger. *Digestive Diseases and Sciences*. In press. [DOI: 10.1007/s10620-011-1701-3](https://doi.org/10.1007/s10620-011-1701-3)
3. Cutler, T.D., **Wang, C.**, Hoff, S.J., Kittawornrat, A., Zimmerman, J.J. (2011). Median infectious dose (ID<sub>50</sub>) of porcine reproductive and respiratory syndrome virus isolate MN-184 via aerosol exposure. *Veterinary Microbiology*, 151 (3-4), 229-237. [DOI:10.1016/j.vetmic.2011.03.003](https://doi.org/10.1016/j.vetmic.2011.03.003)
4. Irwin, C.K., Yoon, K.J., **Wang, C.**, Hoff, S.J., Zimmerman, J.J., Denagamage, T., O'Connor, A.M. (2011) Using the systematic review methodology to evaluate factors that influence the persistence of influenza virus in environmental matrices. *Applied and Environmental Microbiology*, 77(3): 1049-1060. [DOI:10.1128/AEM.02733-09](https://doi.org/10.1128/AEM.02733-09)
5. Prickett, J.R., Johnson, J., Murtaugh, M.P., Puvanendiran, S., **Wang, C.**, Zimmerman, J.J., Opriessnig, T. (2011) Prolonged detection of PCV2 and anti-PCV2 antibody in oral fluids following experimental inoculation. *Transboundary and Emerging Diseases*, 58 (2), 121–127. [DOI: 10.1111/j.1865-1682.2010.01189.x](https://doi.org/10.1111/j.1865-1682.2010.01189.x)
6. Chittick, W.A., Stensland, W.R., Prickett, J.R., Strait, E.L., Harmon, K., Yoon, K.-J., **Wang, C.**, Zimmerman, J.J. (2011). Comparison of RNA extraction and real-time reverse transcription polymerase chain reaction methods for the detection of *porcine reproductive and respiratory syndrome virus* in porcine oral fluid specimens. *Journal of Veterinary Diagnostic Investigation*, 23 (2), 248-253. [DOI:10.1111/j.1865-1682.2010.01189.x](https://doi.org/10.1111/j.1865-1682.2010.01189.x)
7. Schleining, J.A., McClure, S.R., Derrick, T.R., **Wang, C.** (2011). Effects of industrial polystyrene foam insulation pads on the center of pressure and load distribution in the forefeet of clinically normal horses. *American Journal of Veterinary Research*, 72(5), 628-633. [DOI:10.2460/ajvr.72.5.628](https://doi.org/10.2460/ajvr.72.5.628)
8. Drygas, K.A., McClure, S.R., Goring, R.L., Pozzi, A., Robertson, S.A., **Wang, C.** (2011). Effect of cold compression therapy on postoperative pain, swelling, range of motion, and lameness after tibial plateau leveling osteotomy in dogs. *Journal of the American Veterinary Medical Association*, 238(10), 1284-1291. [DOI:10.2460/javma.238.10.1284](https://doi.org/10.2460/javma.238.10.1284)
9. Christensen, B.W., Asa, C.S., **Wang, C.**, Vansandt, L., Bauman, K., Callahan, M., Ellinwood, N.M., Jens, J.K. (2011). Effect of semen collection method on sperm motility of gray wolves (*Canis lupus*) and domestic dogs (*C. l. familiaris*). *Theriogenology*, 76(5), 975-980. [DOI:10.1016/j.theriogenology.2011.05.003](https://doi.org/10.1016/j.theriogenology.2011.05.003)
10. Sinha, A., Schalk, S., Lager, K. M., **Wang, C.**, Opriessnig T. (2011) Singular PCV2a or PCV2b infection results in apoptosis of hepatocytes 3 in clinically affected gnotobiotic pigs. *Research in Veterinary Science*. [DOI:10.1016/j.rvsc.2010.10.013](https://doi.org/10.1016/j.rvsc.2010.10.013)
11. Cutler, T.D., **Wang, C.**, Qin, Q., Zhou, F., Warren, K.J., Yoon, K.-J., Hoff, S.J., Ridpath, L., Zimmerman, J.J. (2011). Kinetics of UV<sub>254</sub> inactivation of selected viral pathogens of animals in a static system. *Journal of Applied Microbiology*, 111, 389-395. [DOI:10.1111/j.1365-2672.2011.05046.x](https://doi.org/10.1111/j.1365-2672.2011.05046.x)

12. Lin, K., **Wang, C.**, Maurtaugh, M.P., Ramamoorthy, S. (2011) Multiplex method for the simultaneous serological detection of porcine reproductive and respiratory syndrome virus and porcine circovirus Type 2. *Journal of Clinical Microbiology*, 49 (9): 3184-3190. [DOI:10.1128/JCM.00557-11](https://doi.org/10.1128/JCM.00557-11)
13. Beisser, A.L., McClure, S., Wang, C., Soring, K., Garrison, R., Peckham, B., (2011). Evaluation of catastrophic musculoskeletal injuries in Thoroughbreds and Quarter Horses at three Midwestern racetracks. *Journal of the American Veterinary Medical Association*, 239 (9): 1236-1241. [DOI:10.2460/javma.239.9.1236](https://doi.org/10.2460/javma.239.9.1236)
14. Wong, D. M., Alcott, C. J., **Wang, C.**, Bornkamp, J.L., Young, J. L., Sponseller, B. A. (2011) Agreement between arterial partial pressure of carbon dioxide and saturation of hemoglobin with oxygen values obtained by direct arterial blood measurements versus noninvasive methods in conscious healthy and ill foals. *Journal of the American Veterinary Medical Association*, 239 (10): 1341-1347. [DOI:10.2460/javma.239.10.1341](https://doi.org/10.2460/javma.239.10.1341)
15. Wang, B., **Wang, C.**, McKean, J.D., Logue, C.M., Gebreyes, W.A., Tivendale, K.A., O'Connor, A.M. (2011). Salmonella enterica in Swine Production: Assessing the Association between Amplified Fragment Length Polymorphism and Epidemiological Units of Concern. *Applied and Environmental Microbiology*, 77(22), 8080-8087. [DOI: 10.1128/AEM.00064-11](https://doi.org/10.1128/AEM.00064-11)
16. Kittawornrat, A. Prickett, J., Wang, C., Olsen, C., Irwin, C., Panyasing, Y., Ballagi, A., Rice, A., Main, R., Johnson, J., Rademacher, C., Hoogland, M., Rowland, R., Zimmerman, J. (2011) Detection of porcine reproductive and respiratory syndrome virus (PRRSV) antibodies in oral fluid specimens using a commercial PRRSV serum antibody ELISA. *Journal of Veterinary Diagnostic Investigation*. In press.
17. Kappes, M.A., Sandbulte, M.R., Platt, R., **Wang, C.**, Lager, K.M., Loving, C.L., Vincent, A.L., Roth, J.A., Kehrli, M.E. Jr. (2011) Vaccination with NS1-truncated H3N2 swine influenza virus primes T cells and confers cross-protection against an H1N1 heterosubtypic challenge in pigs. *Vaccine*. In press.
18. Alcott, C.J., Sponseller, B.A., Wong, D.M., Davis, J.L., Soliman, A.M., **Wang, C.**, Hsu, W. (2011). The Clinical and Immunomodulating Effects of a Ketamine Continuous Rate Infusion in Horses with Experimental Endotoxemia. *Journal of Veterinary Internal Medicine*. In press.
19. Madron, M. S., McClure, S. R., Griffith, R. W., **Wang, C.** (2011). No bactericidal effect of focused shock waves on an in vitro implant biofilm model. *Canadian Journal of Veterinary Research*. In Press.
20. Thompson, A.M., Bergh, M.S., **Wang, C.**, Wells, K. (2011) Tibial plateau leveling osteotomy implant removal: A retrospective analysis of 129 cases. *Veterinary and Comparative Orthopaedics and Traumatology*. In Press.
21. O'Connor, A.M., Shen, H., **Wang, C.**, Opriessnig, T. (2011) Descriptive epidemiology of *Moraxella bovis*, *Moraxella bovoculi* and *Moraxella ovis* in beef calves with naturally occurring Infectious Bovine Keratoconjunctivitis (Pinkeye). *Veterinary Microbiology*. In Press.
22. Kittawornrat, A., Prickett, J., **Wang, C.**, Olsen, C., Irwin, C., Panyasing, Y., Ballagi, A., Rice, A., Main, R., Johnson, J., Rademacher, C., Hoogland, M., Rowland, R., Zimmerman, J. (2011) Detection of porcine reproductive and respiratory syndrome virus (PRRSV) antibodies in oral fluid specimens using a commercial PRRSV serum antibody ELISA. *Journal of Veterinary Diagnostic Investigation*. In Press.

23. Ramirez, A., **Wang, C.**, Prickett, J.R., Pogranichniy, R., Yoon, K.-J., Main, R., Johnson, J.K., Rademacher, C., Hoogland, M., Hoffman, P., Kurtz, A., Kurtz, E., Zimmerman, J.J. (2011). Efficient surveillance of pig populations using oral fluids. *Preventive Veterinary Medicine*. In Press.
24. Shen, H., **Wang, C.**, Madson, D.M., Opriessnig, T. (2010). High prevalence of porcine circovirus viremia in newborn piglets in five clinically normal swine breeding herds in North America. *Preventive Veterinary Medicine*. *Preventive Veterinary Medicine*, 97 (3-4): 228–236. DOI:10.1016/j.prevetmed.2010.09.020
25. Wong, D.M., Alcott, C.J., **Wang, C.**, Hay-Kraus, B., Buchanan, B.R., Brockus, C.W. (2010). Physiologic effects of nasopharyngeal administration of supplemental oxygen at various flow rates in healthy neonatal foals. *American Journal of Veterinary Research*, 71(9):1081-1088. DOI: 10.2460/ajvr.71.9.1081
26. Jergens, A.E., Crandell, J.M., Evans, R., Ackermann, M., Miles, K.G., **Wang, C.** (2010). A clinical index for disease activity in cats with chronic enteropathy. *Journal of Veterinary Internal Medicine*, 24(5): 1027–1033. DOI: 10.1111/j.1939-1676.2010.0549.x
27. King, D., Painter, T., Holtkamp, D., DuBois, P., **Wang, C.** (2010). Effect of injection tool on incidence of head and neck abscesses at slaughter. *Journal of Swine Health and Production*, 18(6): 290-293.
28. Kittawornrat, A., Prickett, J., Chittick, W., **Wang, C.**, Engle, M., Johnson, J., Patnayak, D., Schwartz, T., Whitney, D., Olsen, C., Schwartz, K., Zimmerman, J.J. (2010). Porcine reproductive and respiratory syndrome virus (PRRSV) in serum and oral fluid samples from individual boars: Will oral fluid replace serum for PRRSV surveillance? *Virus Research*, 154(1-2):170-176. DOI:10.1016/j.virusres.2010.07.025
29. **Wang, C.**, Turnbull, B. W., Gröhn, Y. T., and Nielsen, S. S. (2007). Nonparametric estimation of ROC curves based on Bayesian models when the true disease state is unknown. *Journal of Agricultural, Biological, and Environmental Statistics*, 12, 128–146. DOI:10.1198/108571107X178095
30. **Wang, C.**, Turnbull, B. W., Gröhn, Y. T., and Nielsen, S. S. (2006). Estimating receiver operating characteristic curves with covariates when there is no perfect reference test for diagnosis of Johne's disease. *Journal of Dairy Science*, 89, 3038–3046. DOI:10.3168/jds.S0022-0302(06)72577-2

## GRANTS AND PROPOSALS

---

### Awarded:

- ◆ National Pork Board Checkoff research funds      Chong Wang (PI)      10/01/11-9/30/12  
Design and analysis of PRRSV surveillance: temporal and spatial sampling, mapping, monitoring and automated rapid detection of outbreak  
Role: Principle Investigator  
Total Award Amount: \$ 24,378
- ◆ Innovative Swine Industry Enhancement Grant Program, Iowa Attorney General's Office  
Jeffrey Zimmerman (PI)      05/16/11-05/15/12  
Sample size recommendations for the detection of porcine reproductive and respiratory syndrome virus (PRRSV) infection using pen-based oral fluid samples.

Role: Co- Principal Investigator  
Total Award Amount: \$ 50,538

- ◆ NIH U19 AI-091031 Michael W. Cho (PI) 07/01/10-6/30/15  
Enhancing B cell immunity against HIV-1 using novel vaccine delivery platforms  
Role: Statistician  
Total Award Amount: \$ 6,859,390
- ◆ ISU VCS Competitive Grants David Wong (PI) 01/01/11-12/31/11  
Use of Intravenous Polymyxin B to Ameliorate Endotoxemia in Neonatal Foals  
Role: Statistician  
Total Award Amount: \$ 5,320
- ◆ ISU VCS Competitive Grants Bruce W Christensen(PI) 01/01/11-12/31/11  
Somali wild ass (*Equus africanus somaliensis*) chilled semen transport for frozen  
cryopreservation  
Role: Co-Investigator  
Total Award Amount: \$ 4,900
- ◆ Iowa State University CVM Health Livestock Initiative (HLI) 701-05-04-00-0036  
Patrick J. Gorden (PI) 07/01/09-06/30/11  
Development of a Metagenomics Tool Box and Application of Metagenomics to Address  
culture Negative Clinical Mastitis Samples  
Role: Co-Investigator  
Total Award Amount: \$ 30,000

## **PUBLISHED ABSTRACTS/PROCEEDINGS**

---

- ◆ Irwin C, Wang C, Johnson J, Zimmerman J, Kittawornrat A, Prickett J. October 2011. The detection of antibodies to different Subtypes of influenza A virus in swine using a multispecies blocking ELISA. Proc. 54<sup>th</sup> Annual Conference American Association of Veterinary Laboratory Diagnosticians. Buffalo, NY, p. 152.
- ◆ Kittawornrat A, Prickett J, Wang C, Olsen C, Irwin C, Panyasing Y, Ballagi A, Rice A, Main R, Rademacher C, Hoogland M, Zimmerman J. October 2011. Adaptation of a commercial PRRS serum antibody ELISA to oral fluid specimens. American Association of Veterinary Laboratory Diagnosticians. Buffalo, New York, p. 99.
- ◆ Kittawornrat A, Prickett J, Wang C, Olsen C, Irwin C, Panyasing Y, Ballagi A, Rice A, Rowland R, Zimmerman J. October 2011. Diagnostic performance of a commercial PRRS serum Antibody ELISA adapted to oral fluid sapecimens: longitudinal response in experimentally-inoculated populations. American Association of Veterinary Laboratory Diagnosticians. Buffalo, New York, p. 100.
- ◆ Kittawornrat A, Prickett J, Wang C, Olsen C, Irwin C, Panyasing Y, Ballagi A, Rice A, Main R, Rademacher C, Hoogland M, Lowe J, Zimmerman J. October 2011. Diagnostic performance of a commercial PRRS serum antibody ELISA adapted to oral fluid specimens: field samples. American Association of Veterinary Laboratory Diagnosticians. Buffalo, New York, p. 101.
- ◆ Kittawornrat A, Prickett J, Wang C, Olsen C, Irwin C, Panyasing Y, Ballagi A, Rice A, Main R, Rademacher C, Hoogland M, Zimmerman J. October 2, 2011. Adaptation of a commercial

- PRRS serum antibody ELISA to oral fluid specimens. American Association of Veterinary Laboratory Diagnosticians. Buffalo, New York, p. 99.
- ◆ Kittawornrat A, Prickett J, Wang C, Olsen C, Irwin C, Panyasing Y, Ballagi A, Rice A, Rowland R, Zimmerman J. October 2, 2011. Diagnostic performance of a commercial PRRS serum Antibody ELISA adapted to oral fluid sapecimens: longitudinal response in experimentally-inoculated populations. American Association of Veterinary Laboratory Diagnosticians. Buffalo, New York, p. 100.
  - ◆ Kittawornrat A, Prickett J, Wang C, Olsen C, Irwin C, Panyasing Y, Ballagi A, Rice A, Main R, Rademacher C, Hoogland M, Lowe J, Zimmerman J. October 2, 2011. Diagnostic performance of a commercial PRRS serum antibody ELISA adapted to oral fluid specimens: field samples. American Association of Veterinary Laboratory Diagnosticians. Buffalo, New York, p. 101.
  - ◆ Irwin CK, Zimmerman J, Christopher-Hennings J, Harmon K, Kitikoon P, McGill J, Otterson T, Rauh R, Shah R, Skarbek K. June 2011. Detection of influenza A virus in oral fluid ring test samples by RT-PCR. Proc 6th International Symposium on Emerging and Re-emerging Pig Diseases. Barcelona, Spain, p. 284.
  - ◆ Irwin C, Zimmerman J, Wang C, Hesse R, Harmon K, Christopher-Hennings J, Otterson T, McGill J, Vincent A, Shah R, Rauh R. October 2011. Real-Time rt-PCR detection of influenza A Virus in oral fluid using a check test. Proc. 54<sup>th</sup> Annual Conference American Association of Veterinary Laboratory Diagnosticians. Buffalo, NY, p. 153.
  - ◆ Irwin CK, Zimmerman J, Anderson J, Jenkins-Moore M, Leslie-Steen P, Patnayak D, Vincent A, Zhang J. June 2011. Detection of influenza A virus in oral fluid ring test samples by virus isolation. Proc 6th International Symposium on Emerging and Re-emerging Pig Diseases. Barcelona, Spain, p. 283.
  - ◆ Irwin C, Zimmerman J, Jenkins-Moore M, Kitikoon P, Wang C, Anderson J, Leslie-Steen P, Patnayak D, Zhang J. October 2011. Virus Isolation from oral fluid using a check test. 54th Annual Conference American Association of Veterinary Laboratory Diagnosticians. Buffalo, NY. p 68.
  - ◆ Ramirez A, Wang C, Prickett J, Pogranichniy R, Yoon KJ, Main R, Rademacher C, Hoogland M, Johnson JK, Kurtz A, Kurtz E, Zimmerman J. June 2011. Routine collection of epidemiological infectious disease data in pig populations using oral fluids. Proc 6th International Symposium on Emerging and Re-emerging Pig Diseases. Barcelona, Spain, p. 337.
  - ◆ Irwin CK, Zimmerman J, Johnson J, Wang C. June 2011. Influenza A antibody detection over time using a nucleoprotein blocking ELISA. Proc 6th International Symposium on Emerging and Re-emerging Pig Diseases. Barcelona, Spain, p. 282.
  - ◆ Cutler T, Wang C, Hoff S, Kittawornrat A, Zimmerman J. June 2011. Estimating the median infectious dose (ID50) of PRRSV isolate MN-184 via aerosol exposure. Proc 6th International Symposium on Emerging and Re-emerging Pig Diseases. Barcelona, Spain, p. 188.
  - ◆ Kittawornrat A, Engle M, Chittick W, Johnson J, Patnayak D, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. June 2011. Porcine reproductive and respiratory syndrome virus (PRRSV) in serum and oral fluid samples from individual boars: Will oral fluid replace serum for PRRSV surveillance? Proc 6th International Symposium on Emerging and Re-emerging Pig Diseases. Barcelona, Spain, p. 58.
  - ◆ Kittawornrat A, Engle M, Chittick W, Johnson J, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. June 2011. Detection of anti- PRRSV antibodies in oral fluid samples from individual boars using a commercial PRRSV ELISA. Proc 6th

International Symposium on Emerging and Re-emerging Pig Diseases. Barcelona, Spain, p. 216.

- ◆ Irwin C, Prickett J, Kittawornrat A, Johnson J, Wang C, Zimmerman J.J. December 6, 2010. Influenza antibody detection in experimentally inoculated swine over time using a commercially available nucleoprotein ELISA. 91st Ann Meet Conference of Research Workers in Animal Diseases. Chicago, Illinois, Abstr #148. *\*Outstanding Graduate Student Presentation Award (ACVM)*.
- ◆ Irwin C, Prickett J, Kittawornrat A, Johnson J, Wang C, Zimmerman J.J. December 6, 2010. A predictive model for the detection of influenza antibodies over time using a commercially available nucleoprotein ELISA. 91st Ann Meet Conference of Research Workers in Animal Diseases. Chicago, Illinois, Abstr #149.
- ◆ Irwin C, Prickett J, Kittawornrat A, Johnson J, Wang C, Zimmerman J.J. December 6, 2010. Influenza antibody detection in experimentally inoculated swine over time using two commercially-available indirect ELISAs. 91st Ann Meet Conference of Research Workers in Animal Diseases. Chicago, Illinois, Abstr #150.
- ◆ Kittawornrat A, Chittick W, Johnson J, Prickett J, Wang C, Schwartz T, Schwartz K, Whitney D, Olsen C, Zimmerman J. December 6, 2010. PRRSV in serum and oral fluid samples from individual boars: Will oral fluid replace serum for PRRSV surveillance? Proc 91st Ann Meet Conference of Research Workers in Animal Diseases, Abstr #145.
- ◆ Kittawornrat A, Prickett J, Johnson J, Whitney D, Olsen C, Schwartz T, Schwartz K, Wang C, Zimmerman J. December 6, 2010. Detection of anti-PRRSV antibodies in oral fluid samples from individual boars using a commercial PRRS ELISA. Proc 91st Ann Meet Conference of Research Workers in Animal Diseases, Abstr #146.
- ◆ Kittawornrat A, M Engle, W Chittick, J Johnson, D Patnayak, Chong Wang, D Whitney, C Olsen, J Prickett, T Schwartz, K Schwartz, J Zimmerman. November 13, 2010. Porcine reproductive and respiratory syndrome virus (PRRSV) in serum and oral fluid samples from individual boars: Will oral fluid replace serum for PRRSV surveillance? 53rd Annual Conference, American Association of Veterinary Laboratory Diagnosticians. Minneapolis, Minnesota. P51
- ◆ Kittawornrat A, M Engle, W Chittick, J Johnson, D Patnayak, Chong Wang, D Whitney, C Olsen, J Prickett, T Schwartz, K Schwartz, J Zimmerman. November 13, 2010. Detection of anti-PRRSV antibodies in oral fluid samples from individual boars using a commercial ELISA. 53rd Annual Conference, American Association of Veterinary Laboratory Diagnosticians. Minneapolis, Minnesota. P52
- ◆ Wang C, Prickett J, Hoogland M, Main R, Rademacher C, Chittick W, Kolb J, Kurtz A, Kurtz E, Muñoz R, Zimmerman JJ. September 2010. Probability of detecting a singleton PRRSV viremic pig using pen-based oral fluid samples. Allen D. Leman Swine Conference. St. Paul, Minnesota, p. 47.
- ◆ Kittawornrat A, M Engle, W Chittick, J Johnson, D Patnayak, C Wang, D Whitney, C Olsen, J Prickett, T Schwartz, K Schwartz, J Zimmerman. September 2010. Virus del síndrome respiratorio y reproductivo porcino (PRRSV) en suero y fluidos orales de sementales alojados individualmente. ¿Reemplazarán los fluidos orales al suero en estudios de vigilancia epidemiológica para PRRSV? XXII Congreso Panamericano de Ciencias Veterinarias. Lima, Peru.

- ◆ Jergens AE, Nettleton D, Suchodolski JS, Wymore M, Wilke V, Dowd S, Steiner JM, Wang C, Wannemuehler MJ, (2010). Relationship of mucosal gene expression to microbiota composition in dogs with inflammatory bowel disease. *Journal of Veterinary Internal Medicine*, 24(3), 725-725, meeting abstract: 177.
- ◆ Morrison J, Jergens A, Deitz K, Miles K, King R, Wang C, Winter M, Flatjord C, Hodnefield A (2010). Comparison of models for predicting renal disease following i-131 therapy for feline hyperthyroidism. *Journal of Veterinary Internal Medicine*, 24(3), 744-745, meeting abstract: 242.
- ◆ Morrison J, Jergens A, Deitz K, Miles K, King R, Wang C, Winter M, Flatjord C, Hodnefield A (2010). Investigation of prognostic factors for the development of renal disease following i-131 therapy in feline hyperthyroidism. *Journal of Veterinary Internal Medicine*, 24(3), 725-725, meeting abstract: 243.
- ◆ Morrison J, Clemans J, Wang C (2010). Retrospective investigation of survival factors in canine disseminated histoplasmosis. *Journal of Veterinary Internal Medicine*, 24(3), 744-745, meeting abstract: 305.
- ◆ Kittawornrat A, Engle M, Johnson J, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. (2010). Colección de muestras de fluidos orales para diagnóstico de sementales individuales. XXII Congreso Panamericano de Ciencias Veterinarias. Lima, Peru.
- ◆ Irwin CK, O'Connor A, Wang C, Yoon KJ, Zimmerman J. (2010). Assessing the evidence of published studies reporting factors associated with the stability of influenza in the environment using a systematic review. *Proceedings of the American Association of Swine Veterinarians*. Omaha, Nebraska, pp. 363.
- ◆ Cutler TD, Kittawornrat A, Hoff SJ, **Wang C**, Zimmerman JJ. March 2010. Median infectious dose (ID<sub>50</sub>) of PRRSV isolate MN-184 for young pigs via aerosol exposure. *Proceedings of the American Association of Swine Veterinarians*. Omaha, Nebraska, pp. 361.
- ◆ Cutler TD, Hoff SJ, **Wang C**, Warren KJ, Zhou F, Qin Q, Miller C, Ridpath JF, Yoon K-J, Zimmerman J. March 2010. UV<sub>254</sub> inactivation of selected viral pathogens. *Proceedings of the American Association of Swine Veterinarians*. Omaha, Nebraska, pp. 115.
- ◆ Kittawornrat A, Engle MJ, Johnson JF, Chittick WA, Prickett JR, Schwartz TJ, Whitney DJ, Olsen CW, Schwartz KJ, Wang C, Zimmerman. 2010. Use of oral fluid samples to detect PRRSV infection in individual boars. *Proceedings of the 21st International Pig Veterinary Society Congress*. Vancouver, Canada, p. 201.
- ◆ Kittawornrat A, Chittick W, Stensland W, Prickett JR, Wang C, Strait E, Yoon K-J, Zimmerman JJ. July 2010. Optimization of PRRS PCR for oral fluid testing. *Proceedings of the 21st International Pig Veterinary Society Congress*. Vancouver, Canada, p. 484.
- ◆ Cutler TD, Hoff SJ, Wang C, Warren KJ, Zhou F, Qin Q, Miller C, Ridpath J, Yoon K-J, Zimmerman JJ. July 2010. UV<sub>254</sub> inactivation of selected viral pathogens. *Proceedings of the 21st International Pig Veterinary Society Congress*. Vancouver, Canada, p. 936.
- ◆ Johnson J, Engle M, Kittawornrat A, Prickett JR, Schwartz, T, Whitney D, Olsen C, Schwartz K, Wang C, Zimmerman J. July 2010. Oral fluid diagnostic samples can be collected from individually-penned adult swine. *Proceedings of the 21st International Pig Veterinary Society Congress*. Vancouver, Canada, p. 512.

- ◆ Cutler TD, Kittawornrat A, Hoff SJ, Wang C, Zimmerman JJ. July 2010. Median infectious dose (ID50) of PRRSV isolate MN-184 for young pigs via aerosol exposure. Proceedings of the 21st International Pig Veterinary Society Congress. Vancouver, Canada, p. 506.
- ◆ Lin K, Wang C, Murtaugh M, Wong S, Yoon K-J, Halbur PG, Zimmerman J, Meng X-J, Ramamoorthy S. June 2010. A micro-bead array (MBA)-based immunoassay for the simultaneous detection of antibody responses to porcine circovirus type 2 (PCV2) and porcine reproductive and respiratory syndrome virus (PRRSV). Proc 49th North Central Conference of Veterinary Laboratory Diagnosticians. Manhattan, Kansas.
- ◆ Christensen BW, Wang C, Penfold LM. Developing a cooled semen protocol for captive breeding of Somali wild ass (*Equus africanus somaliensis*). 7th Biennial Meeting of the Association for Applied Animal Andrology, August 28-29, 2010, Sydney, Australia, 2010.
- ◆ Christensen BW, Wang C, Citino S, Penfold LM. Developing a cooled semen protocol for captive breeding of okapi (*Okapia johnstoni*). 7th Biennial Meeting of the Association for Applied Animal Andrology, August 28-29, 2010, Sydney, Australia, 2010.
- ◆ Christensen BW, Bauman K, Junge R, VanSant L, Lorton S, Wang C, Asa CS. Semen cryopreservation and transcervical insemination in the Mexican gray wolf (*Canis lupus baileyi*). Annual meeting of the American Association of Zoo Veterinarians, October 23-29, 2010, South Padre Island, Texas, 2010.
- ◆ Cutler TD, Kittawornrat A, Hoff SJ, Wang C, Zimmerman JJ. (2009). Infectious dose (ID50) of PRRSV isolate MN-184 for young pigs via aerosol exposure. Proc 2009 International PRRS Symposium. Chicago, Illinois, p 67.
- ◆ Cutler TD, Hoff SJ, Wang C, Warren KJ, Zhou F, Qin Q, Miller C, Ridpath JF, Yoon K-J, Zimmerman J. (2009). UV254 inactivation of selected viral pathogens. Proc 2009 International PRRS Symposium. Chicago, Illinois, p 66.
- ◆ Cutler T, Hoff S, Wang C, Warren K, Zhou F, Qin Q, Miller C, Ridpath J, Yoon K-J, Zimmerman J. (2009). UV254 Inactivation of Selected Viral Pathogens. 52st Annual Conference, American Association of Veterinary Laboratory Diagnosticians. San Diego, California, p. 124.
- ◆ Cutler T, Kittawornrat A, Hoff S, Wang C, Zimmerman J. (2009). Median infectious dose (ID50) of PRRSV isolate MN-184 for young pigs via aerosol exposure. 52st Annual Conference, American Association of Veterinary Laboratory Diagnosticians. San Diego, California, p. 110.
- ◆ Cutler TD, Hoff SJ, Wang C, Warren KJ, Zhou F, Qin Q, Miller C, Ridpath JF, Yoon K-J, Zimmerman J. December 2009. UV254 inactivation of selected viral pathogens. Proc 90th Ann Meet Conference of Research Workers in Animal Diseases, Abstr #23.
- ◆ Wang, C., Turnbull, B. W. and Gröhn, Y. T. (2007). Adjusting ROC curve estimates for covariates without gold standard tests, 2006 *Proceedings of the American Statistical Association, Statistics in Epidemiology Section, Seattle, WA*: American Statistical Association, 2645-2649.
- ◆ Wang, C., Turnbull, B. W. and Gröhn, Y. T. (2005). A flexible Bayesian approach to estimate ROC curves when there is no gold standard test, 2005 *Proceedings of the American Statistical Association, Biometry Section, Minneapolis, MN*: American Statistical Association, 407-410.

## HONORS and AWARDS

---

- ◆ Student Paper Award, the Statistics in Epidemiology Section, American Statistical Association, 2006
- ◆ Paper Award, John's Disease Integrated Program (JDIP) 2nd Annual Conference, 2006
- ◆ Best Student Paper Award, International Chinese Statistical Association, 2005
- ◆ Graduate School Travel Award and Fellowship, Cornell University 2005, 2006
- ◆ Excellent Academic Award, Peking University, 2000
- ◆ Eaglet Award, Peking University, 1998, 1999
- ◆ Freshman Scholarship, Peking University, 1997
- ◆ Silver Medal in CMO (Chinese Mathematics Olympic), 1997

## PROFESSIONAL ACTIVITIES

---

- ◆ Technical Committee of the USDA North Central Regional Project 229: Detection and control of porcine reproductive and respiratory syndrome virus and emerging viral diseases of swine
- ◆ Chair for Topic Contributed Session 459 -- Shrinkage Theory and its Applications, *Joint statistical meetings*, Salt Lake City, UT, 2007
- ◆ Referee for the journals *Biometrics*, *Bioinformatics*, *Statistics in Medicine* and *Contemporary Clinical Trials*
- ◆ Member of American Statistical Association (ASA), Institute of Mathematical Statistics (IMS), International Biometric Society (ENAR), and International Chinese Statistical Association (ICSA)

## GRADUATE POS COMMITTEES

---

### Current

- ◆ Major professor for 1 PhD student and 2 MS students. Committee member for 4 PhD Students and 2 MS students.

### Completed

- ◆ Major Professor for 1 MS student. Committee member for 3 PhD students and 1 MS student.

## TEACHING EXPERIENCES

---

### At Iowa State University:

- ◆ **Instructor for VDPAM 527:** Applied Statistical Methods in Population Studies, Iowa State University, Fall 2009, Fall 2011
- ◆ **Instructor for STAT 401:** Statistical Methods for Researchers, Iowa State University, Fall 2009, Fall 2010, Fall 2011

### Elsewhere:

- ◆ **Instructor for STA 570:** Basic Statistical Analysis, University of Kentucky, Fall 2008
- ◆ **Instructor for CPH 930:** Advanced Biostatistics Methods in Public Health, University of Kentucky, Spring 2008
- ◆ **Instructor for STA 291:** Statistical Method, University of Kentucky, Fall 2007
- ◆ **Instructor for MATH 171:** Statistical Theory and Application, Cornell University, Fall 2006, Spring 2007

## INVITED TALKS

---

- ◆ Method of Moments Estimation for the Proportion of the True Null Hypotheses in Multiple Testing. Iowa State University 2009 Conference in Statistics. Ames, IA. June 2009.
- ◆ ROC Analysis for Longitudinal Disease Diagnostic Data Without a Gold Standard Test  
*University of Kentucky, KY, 2007*  
*University of Pittsburgh, PA, 2007*  
*University of Arizona, AZ, 2007*  
*University of Missouri at Kansas City, MO, 2007*  
*New Jersey Institute of Technology, NJ, 2007*  
*California State University, Long Beach, CA, 2007*  
*Georgia Southern University, GA, 2007*
- ◆ Estimation of ROC Curves when There Is No Perfect Reference Test  
*Brown University, RI, 2006*  
*University of Missouri at Columbia, MO, 2006*

## CONFERENCE PRESENTATIONS

---

- ◆ **Wang, C.**, Turnbull, B. W., Nielsen, S. S. and Gröhn, Y. T., Bayesian analysis of longitudinal Johne's disease diagnostic data without a gold standard test. 2011 ADSA-ASAS Joint Annual Meeting. July 2011, New Orleans, LA.
- ◆ Kittawornrat A, Engle M, Chittick W, Johnson J, Patnayak D, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. June 14, 2011. Porcine reproductive and respiratory syndrome virus (PRRSV) in serum and oral fluid samples from individual boars: Will oral fluid replace serum for PRRSV surveillance? 6th International Symposium on Emerging and Re-emerging Pig Diseases. Barcelona, Spain.
- ◆ Wang C, Prickett J, Hoogland M, Main R, Rademacher C, Chittick W, Kolb J, Kurtz A, Kurtz E, Muñoz R, Zimmerman JJ. Probability of detecting a singleton PRRSV viremic pig using en-based oral fluid samples. Allen D. Leman Swine Conference. St. Paul, Minnesota. September 20, 2010.
- ◆ Kittawornrat A, Chittick W, Johnson J, Prickett J, Wang C, Schwartz T, Schwartz K, Whitney D, Olsen C, Zimmerman J. December 6, 2010. PRRSV in serum and oral fluid samples from individual boars: Will oral fluid replace serum for PRRSV surveillance? 91st Ann Meet Conference of Research Workers in Animal Diseases. Chicago, Illinois.
- ◆ Kittawornrat A, Prickett J, Johnson J, Whitney D, Olsen C, Schwartz T, Schwartz K, Wang C, Zimmerman J. December 6, 2010. Detection of anti-PRRSV antibodies in oral fluid samples from individual boars using a commercial PRRS ELISA. 91st Ann Meet Conference of Research Workers in Animal Diseases. Chicago, Illinois.
- ◆ Irwin C, Prickett J, Kittawornrat A, Johnson J, Wang C, Zimmerman J. December 6, 2010. Influenza antibody detection in experimentally inoculated swine over time using a commercially available nucleoprotein ELISA. 91st Ann Meet Conference of Research Workers in Animal Diseases. Chicago, Illinois. \*Outstanding Graduate Student Presentation Award (American College of Veterinary Microbiology)
- ◆ Irwin C, Prickett J, Kittawornrat A, Johnson J, Wang C, Zimmerman J. December 6, 2010. A predictive model for the detection of influenza antibodies over time using a commercially

available nucleoprotein ELISA. 91st Ann Meet Conference of Research Workers in Animal Diseases. Chicago, Illinois.

- ◆ Irwin C, Prickett J, Kittawornrat A, Johnson J, Wang C, Zimmerman J. December 6, 2010. Influenza antibody detection in experimentally inoculated swine over time using two commercially-available indirect ELISAs. 91st Ann Meet Conference of Research Workers in Animal Diseases. Chicago, Illinois.
- ◆ Lin X, Wang C, Murtaugh M, Yoon K-J, Zimmerman J, Halbur P, Meng X-J, Ramamoorthy S. November 13, 2010. A multiplex method for the serological detection of swine respiratory pathogens. 53rd Annual Conference, American Association of Veterinary Laboratory Diagnosticians. Minneapolis, Minnesota.
- ◆ Kittawornrat A, Engle M, Chittick W, Johnson J, Patnayak D, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. November 13, 2010. Porcine reproductive and respiratory syndrome virus (PRRSV) in serum and oral fluid samples from individual boars: Will oral fluid replace serum for PRRSV surveillance? 53rd Annual Conference, American Association of Veterinary Laboratory Diagnosticians. Minneapolis, Minnesota.
- ◆ Kittawornrat A, Engle M, Chittick W, Johnson J, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. November 13, 2010. Detection of anti-PRRSV antibodies in oral fluid samples from individual boars using a commercial ELISA. 53rd Annual Conference, American Association of Veterinary Laboratory Diagnosticians. Minneapolis, Minnesota.
- ◆ Kittawornrat A, Engle M, Chittick W, Johnson J, Patnayak D, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. September 5, 2010. Virus del síndrome respiratorio y reproductivo porcino (PRRSV) en suero y fluidos orales de sementales alojados individualmente. ¿Reemplazarán los fluidos orales al suero en estudios de vigilancia epidemiológica para PRRSV? XXII Congreso Panamericano de Ciencias Veterinarias. Lima, Peru.
- ◆ Kittawornrat A, Engle MJ, Johnson JF, Chittick WA, Prickett JR, Schwartz TJ, Whitney DJ, Olsen CW, Schwartz KJ, Wang C, Zimmerman. July 19, 2010. Use of oral fluid samples to detect PRRSV infection in individual boars. Proceedings of the 21st International Pig Veterinary Society Congress. Vancouver, Canada, p. 201.
- ◆ Ramamoorthy S, Lin K, Wang C, Murtaugh M, Wong S, Yoon K-J, Halbur PG, Zimmerman J, Meng X-J. June 17, 2010. A micro-bead array (MBA)-based immunoassay for the simultaneous detection of antibody responses to porcine circovirus type 2 (PCV2) and porcine reproductive and respiratory syndrome virus (PRRSV). 49th Annual North Central Conference of Veterinary Laboratory Diagnosticians. Manhattan, Kansas.
- ◆ Cutler TD, Hoff SJ, Wang C, Warren KJ, Zhou F, Qin Q, Miller C, Ridpath JF, Yoon K-J, Zimmerman J. March 6, 2010. UV254 inactivation of selected viral pathogens. 41st Annual Meeting of the American Association of Swine Veterinarians. Omaha, Nebraska.
- ◆ Wang, C. and Liu, P. Method of Moments Estimation for the Proportion of the True Null Hypotheses in Multiple Testing. Iowa State University 2009 Conference in Statistics. Ames, IA. June 2009.
- ◆ Wang, C., Turnbull, B. W., Gröhn, Y. T., and Nielsen, S. S., ROC Analysis for Longitudinal Disease Diagnostic Data Without a Gold Standard Test, *Joint statistical meetings*, Salt Lake City, UT, 2007

- ◆ Wang, C., Turnbull, B. W., Gröhn, Y. T., and Nielsen, S. S., ROC Analysis for Longitudinal Disease Diagnostic Data Without a Gold Standard Test, *the 3rd Annual Johne's Disease Integrated Program (JDIP) Conference*, College Station, TX, 2007
- ◆ Wang, C., Turnbull, B. W., Gröhn, Y. T., and Nielsen, S. S., Statistical Models for Estimating ROC Curves with Covariates When There Is No Perfect Reference Test, *the 2nd Annual Johne's Disease Integrated Program (JDIP) Conference*, Davis, CA, 2006
- ◆ Wang, C., Turnbull, B. W., Gröhn, Y. T., and Nielsen, S. S., Adjusting ROC Curves Estimation for Covariates without Gold Standard Tests, *Joint statistical meetings*, Seattle, WA, 2006
- ◆ Wang, C., Turnbull, B. W., Gröhn, Y. T., and Nielsen, S. S., Bayesian Non-parametric Estimation of ROC Curves When the True Disease State is Unknown: Application to Diagnosis of Johne's Disease in Cows, *Joint statistical meetings*, Minneapolis, MN, 2005
- ◆ Wang, C., Turnbull, B. W., Gröhn, Y. T., and Nielsen, S. S., Bayesian Non-parametric Estimation of ROC Curves When the True Disease State is Unknown: Application to Diagnosis of Johne's Disease in Cows, *ICSA 2005 Applied Statistics Symposium*, MD , 2005

## POSTER PRESENTATIONS

---

- ◆ Kittawornrat A, Engle M, Chittick W, Johnson J, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. December 2010. Detection of anti-PRRSV antibodies in oral fluid samples from individual boars using a commercial PRRS ELISA. Proc 2010 International PRRS Symposium. Chicago, Illinois, p. #78.
- ◆ Kittawornrat A, Engle M, Chittick W, Johnson J, Patnayak D, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. December 2010. PRRSV in serum and oral fluid samples from individual boars: Will oral fluid replace serum for PRRSV surveillance? Proc 2010 International PRRS Symposium. Chicago, Illinois, p. #79.
- ◆ Christensen BW, Wang C, Penfold LM. Developing a cooled semen protocol for captive breeding of Somali wild ass (*Equus africanus somaliensis*). the 7th Biennial Conference of the Association for Applied Animal Andrology, Darling Harbour, Sydney, Australia, August 28-29, 2010
- ◆ Christensen BW, Citino SB, Wang C, Penfold LM. Developing a semen extension protocol for captive breeding of okapi (*Okapia johnstoni*). the 7th Biennial Conference of the Association for Applied Animal Andrology, Darling Harbour, Sydney, Australia, August 28-29, 2010
- ◆ Kittawornrat A, Engle M, Johnson J, Wang C, Whitney D, Olsen C, Prickett J, Schwartz T, Schwartz K, Zimmerman J. September 5 2010. Colección de muestras de fluidos orales para diagnóstico de sementales individuales. XXII Congreso Panamericano de Ciencias Veterinarias. Lima, Peru.
- ◆ Kittawornrat A, Chittick W, Stensland W, Prickett JR, Wang C, Strait E, Yoon K-J, Zimmerman JJ. July 2010. Optimization of PRRS PCR for oral fluid testing. Proceedings of the 21st International Pig Veterinary Society Congress. Vancouver, Canada, p. 484.
- ◆ Irwin CK, O'Connor A, Wang C, Yoon KJ, Zimmerman J. (2010). Assessing the evidence of published studies reporting factors associated with the stability of influenza in the environment using a systematic review. Proceedings of the American Association of Swine Veterinarians. Omaha, Nebraska, pp. 363.

- ◆ Cutler TD, Kittawornrat A, Hoff SJ, Wang C, Zimmerman JJ. September 2010. Dosis infective 50 (DL50) del aislamiento MN-184 de PRRSV en cerdas jóvenes a través de la exposición por aerosoles. XXII Congreso Panamericano de Ciencias Veterinarias. Lima, Peru.
- ◆ Cutler TD, Hoff SJ, Wang C, Warren KJ, Zhou F, Qin Q, Miller C, Ridpath JF, Yoon K-J, Zimmerman J. September 2010. Inactivación de agents patógenos virales seleccionados mediante luz ultravioleta (UV<sub>254</sub>). XXII Congreso Panamericano de Ciencias Veterinarias. Lima, Peru.
- ◆ Cutler TD, Kittawornrat A, Hoff SJ, Wang C, Zimmerman JJ. December 2009. Infectious dose (ID50) of PRRSV isolate MN-184 for young pigs via aerosol exposure. Proc 2009 International PRRS Symposium. Chicago, Illinois, p 67.
- ◆ Cutler TD, Hoff SJ, Wang C, Warren KJ, Zhou F, Qin Q, Miller C, Ridpath JF, Yoon K-J, Zimmerman J. December 2009. UV254 inactivation of selected viral pathogens. Proc 2009 International PRRS Symposium. Chicago, Illinois, p 66.