

JANE CHRISTOPHER-HENNINGS

Educational Background

MS 1990: University of Wisconsin-Madison Veterinary Science
DVM 1983: University of Minnesota-St. Paul Veterinary Medicine
BS 1975: University of Wisconsin-Madison Natural Resources

Professional Experience

August 2013 to present Head, South Dakota State University Veterinary and Biomedical Sciences Department
August 2013 to present Director, South Dakota Animal Disease Research and Diagnostic Laboratory
June 2007 to present Professor, South Dakota State University
June 2000 to 2007: Associate Professor, South Dakota State University
January 1996-June 2000: Assistant Professor, South Dakota State University
1990-1995: Post-doctoral Research Associate, South Dakota State University,
1989-1990: Research Associate (Master's Degree),
University of Wisconsin, Madison
1983-1989: Private Veterinary Practice, Rapid City, South Dakota

Leadership Responsibilities and Honors

Executive Committee, Association of American Veterinary Medical Colleges (AAVMC), at large representative for Departments of Veterinary Sciences. 2016

Executive Committee, American Association of Veterinary Laboratory Diagnosticians (AAVLD) 2015-2016

Editorial Board Member, Journal of Swine Health and Production in the areas of swine virology and immunology, 2013 to present.

Section Leader, Molecular Diagnostics (started this laboratory section in 1996 as a result of my research), Animal Disease Research & Diagnostic Laboratory, Molecular Diagnostics 1996 to 2016.

Section Leader, ADRDL Clinical Pathology 1996 through 2002

USDA Panel member 2011, United States Department of Agriculture, Small Business Innovation Research Grants, Washington DC Meeting.

USDA Panel Member, 2005, United States Department of Agriculture, National Competitive Research Initiative Grants Program, Washington D.C. Meeting.

USDA Panel Member, United States Department of Agriculture. National Competitive Research Initiative Grants Program, PRRS-CAP Program, 2005.

Scientific Committee Chair, International PRRSV Symposium, Chicago, IL, 2010, 2011.

USDA, Agricultural Experiment Station NC-229 (Multi-State), Chair, 2012, 2013: Detection and control of Porcine Reproductive and Respiratory Syndrome Virus and emerging viral diseases of swine.

Committee Member, Swine Health and Information Center, Preparedness and Response Working Group, 2015 to present

Committee Member, South Dakota Poultry Association, Executive Advisory Board Member 2013 to present

Committee Member, American Association of Swine Veterinarians (AASV) Swine Health Committee 2010 to present.

Co-chair of the American Association of Veterinary Laboratory Diagnosticians Virology Committee 2005-2007.

Secretary, USDA, Agricultural Experiment Station NC-229 (Multi-State), 2010, 2011. Detection and control of Porcine Reproductive and Respiratory Syndrome Virus and emerging viral diseases of swine.

Station Representative, USDA, Agricultural Experiment Station NC229 Station Representative for South Dakota State University (PRRSV Integrated Program), 2005-2016.

SD Representative, National Animal Health Laboratory Network (NAHLN) Methods Technical Working Group, Representative from the Animal Disease Research and Diagnostic Laboratory, South Dakota State University, 2006 to present.

Veterinary Science Department, Library Representative, 1998 to 2010.

Organizing Committee member, International PRRSV Meeting, St. Louis MO 2005.

President, West River Veterinary Association, Rapid City, SD, 1983.

Honors

Dean's Team Award for Contributions to the Center for Infectious Disease Research and Vaccinology, 2005 (Governor's 2010 Program).

Hanson Award. Individual award from the University of Minnesota for outstanding contributions in the swine industry, September 2002.

Professional Memberships

American Association of Swine Veterinarians
American Association of Veterinary Laboratory Diagnosticians
American Veterinary Medical Association
Conference for Research Workers in Animal Diseases
South Dakota Veterinary Medical Association

PubMed Refereed Articles

1. Diel, D.G., S. Lawson, F. Okda, A. Singrey, T. Clement, M.H.V. Fernandes, **J. Christopher-Hennings**, E.A. Nelson. 2016. Porcine epidemic diarrhea virus: an overview of current virological and serological diagnostic methods. *Virus Research*. doi.org/10.1016/j.virusres.2016.05.013.
2. Goodell C, J Zhang, E Strait, K Harmon, D Patnayak, T Otterson, M Culhane, **J Christopher-Hennings**, T Clement, P Leslie-Steen, R Hesse, J Anderson, K Skarbek, A Vincent, P Kitikoon, S Swenson, M Jenkins-Moore, Ji McGill, R Rauh, W Nelson, C O'Connell, R Shah, C Wang, R Main, J Zimmerman 2016. Ring test evaluation of the detection of influenza A virus in swine oral fluids by real-time reverse-transcription polymerase chain reaction and virus isolation. *Canadian Journal of Veterinary Research*. 80:12-20.
3. Okda, F., S. Lawson, X. Liu, A. Singrey, T. Clement, J. Nelson, **J. Christopher-Hennings**, E.A. Nelson. 2016. Development of monoclonal antibodies and serological assays including indirect ELISA and fluorescent microsphere immunoassays for diagnosis of porcine deltacoronavirus. *BMC Vet. Res.* 12:95. doi: 10.1186/s12917-016-0716-6.
4. Quast M; Sreeniyasan C.; Sexton G, Hunter N, Singrey A, Fawcett L, Miller G, Lauer D, S Voss S, S Pollock, C Cunhad, **J Christopher-Hennings**, E Nelson, F Li. 2015. Serological evidence for the presence of influenza D virus in small ruminants. *Veterinary Microbiology* 180:281-285.
5. Clement, T; G Kutish, J Nezworski, J Scaria, Eric Nelson, **J Christopher-Hennings**, D Diel. 2015. Complete Genome Sequence of a Highly Pathogenic Avian Influenza Virus (H5N2) Associated with an Outbreak in Commercial Chickens, Iowa, USA, 2015. *Genome announcements*. 3:e00613,
6. Joshi, L., K. Mohr, T. Clement, K. Hain, B. Myers, J. Yaros, E. Nelson, **J. Christopher-Hennings**, D. Gava, R. Schaefer, L. Caron, S. Dee, D. Diel. 2016. Detection of the Newly Emerging Senecavirus A in Pigs, Mice and Houseflies. *J Clin Micro.* 54:1536-1545. doi: 10.1128/JCM.03390-15.
7. Dee, S., C. Neill, A. Singrey, T. Clement, R. Cochrane, C. Jones, G. Patterson, **J. Christopher-Hennings**, E. Nelson. 2016. Modeling the transboundary risk of feed ingredients contaminated with porcine epidemic diarrhea virus. *BMC Vet. Res.* 12:51.
8. Okda F., Liu X, Singrey A, Clement T, Nelson J, **Christopher-Hennings J**, Nelson EA, Lawson S. 2015. Development of an indirect ELISA, blocking ELISA, fluorescent microsphere immunoassay and fluorescent focus neutralization assay for serologic evaluation of exposure to North American strains of Porcine Epidemic Diarrhea Virus. *BMC Veterinary Research*, In press.
9. Dee, S., C. Neill, T. Clement, A. Singrey, **J. Hennings**, E. Nelson. 2015. An evaluation of porcine epidemic diarrhea virus survival in individual feed ingredients in the presence or absence of a liquid antimicrobial. *Porcine Health Management*. 2015,1:9 doi:10.1186/s40813-015-0003-0..
10. Ran Z, H. Shen, Y. Lang, E. Kolb, N.i Turan, L. Zhu, J. Ma, B. Bawa, Q. Liu, H. Liu, M. Quast, G. Sexton, F.Krammer, B. Hause, **J Christopher-Hennings**, E. Nelson, J. Richt, F. Li, W. Ma. 2015. Domestic pigs are susceptible to infection with influenza B viruses. *J. Virology* 89:4818-4826..

11. Dee S, C Neill, T Clement, **J Christopher-Hennings**, E. Nelson. 2014. An evaluation of a liquid antimicrobial (Sal CURB®) for reducing the risk of porcine epidemic diarrhea virus infection of naïve pigs during consumption of contaminated feed. *BMC Veterinary Research*, 10:220.
12. Dee S, T. Clement, A. Schelkopf, J. Nerem, D. Knudsen, **J Christopher-Hennings**, E. Nelson. 2014. An evaluation of contaminated complete feed as a vehicle for porcine epidemic diarrhea virus infection of naïve pigs following consumption via natural feeding behavior: Proof of concept. *BMC Veterinary Research*, 10:176.
13. **Christopher-Hennings J**, K Araujo, Ying Fang, Steve Lawson, Eric Nelson, Joan Lunney. 2013. Considerations for performing Luminex multianalyte profiling (xMAP) in veterinary diagnostic laboratories. *J Vet Diagn Invest* 25,773.
14. Hanmo Zhang; Xueshui Guo; Eric Nelson; **Jane Christopher-Hennings**; Xiuqing Wang. Porcine reproductive and respiratory syndrome virus activates the transcription of interferon alpha/beta (IFN- α/β) in monocyte-derived dendritic cells (Mo-DC). *Vet. Microbiol.* 159, 494 (2012).
15. Tavis K Anderson; William W Laegreid; Francesco Cerutti; Fernando A Osorio; Eric A Nelson; **Jane Christopher-Hennings**; Tony L Goldberg. Ranking viruses: measures of positional importance within networks define core viruses for rational polyvalent vaccine development. *Bioinformatics* 28, 1624 (2012).
16. Xiuqing Wang; **Jane Christopher-Hennings**. Post-transcriptional control of type I interferon induction by porcine reproductive and respiratory syndrome virus in its natural host cells. *Viruses* 4, 725 (2012).
17. Robert J Langenhorst; Steven Lawson; Apisit Kittawornrat; Jeffrey J Zimmerman; Zhi Sun; Yanhua Li; **Jane Christopher-Hennings**; Eric A Nelson; Ying Fang et al. Development of a fluorescent microsphere immunoassay for detection of antibodies against porcine reproductive and respiratory syndrome virus using oral fluid samples as an alternative to serum-based assays. *Clin. Vaccine Immunol.* 19, 180 (2012).
18. Steven R Lawson; Yanhua Li; John B Patton; Robert J Langenhorst; Zhi Sun; Zhiyong Jiang; **Jane Christopher-Hennings**; Eric A Nelson; David Knudsen; Ying Fang. Interleukin-1 β expression by a recombinant porcine reproductive and respiratory syndrome virus. *Virus Res.* 163, 461 (2012).
19. Steven Lawson; Joan Lunney; Federico Zuckermann; Fernando Osorio; Eric Nelson; Craig Welbon; Travis Clement; Ying Fang; Susan Wong; Karen Kulas; **Jane Christopher-Hennings**. Development of an 8-plex Luminex assay to detect swine cytokines for vaccine development: assessment of immunity after porcine reproductive and respiratory syndrome virus (PRRSV) vaccination. *Vaccine* 28, 5356 (2010).
20. Dan Wang; Aaron Harmon; Jing Jin; David H Francis; **Jane Christopher-Hennings**; Eric Nelson; Ronald C Montelaro; Feng Li. The lack of an inherent membrane targeting signal is responsible for the failure of the matrix (M1) protein of influenza A virus to bud into virus-like particles. *J. Virol.* 84, 4673 (2010)
21. Joan K Lunney; Eric R Fritz; James M Reecy; Daniel Kuhar; Elizabeth Prucnal; Ramon Molina; **Jane Christopher-Hennings**; Jeffrey Zimmerman; Raymond R R Rowland. Interleukin-8,

- interleukin-1beta, and interferon-gamma levels are linked to PRRS virus clearance. *Viral Immunol.* 23, 127 (2010).
22. Zhenhai Chen; Xiaoxin Zhou; Joan K Lunney; Steven Lawson; Zhi Sun; Elizabeth Brown; **Jane Christopher-Hennings**; David Knudsen; Eric Nelson; Ying Fang. Immunodominant epitopes in nsp2 of porcine reproductive and respiratory syndrome virus are dispensable for replication, but play an important role in modulation of the host immune response. *J. Gen. Virol.* 91, 1047 (2010).
 23. Z Chen; S Lawson; Z Sun; X Zhou; X Guan; **J Christopher-Hennings**; E A Nelson; Y Fang. Identification of two auto-cleavage products of nonstructural protein 1 (nsp1) in porcine reproductive and respiratory syndrome virus infected cells: nsp1 function as interferon antagonist. *Virology* 398, 87 (2010).
 24. R M Molina; E A Nelson; **J Christopher-Hennings**; R Hesse; R R R Rowland; J J Zimmerman. Evaluation of the risk of PRRSV transmission via ingestion of muscle from persistently infected pigs. *Transbound Emerg Dis* 56, 1 (2009).
 25. Michael S Kinch; Abdul S Yunus; Calli Lear; Hanwen Mao; Hanson Chen; Zena Fesseha; Guangxiang Luo; Eric A Nelson; Limin Li; Zhuhui Huang; M. Mury; W. Y. Ellis, L. Hensley, **J. Christopher-Hennings**; G. G. Olinger, M. Goldblatt. FGI-104: a broad-spectrum small molecule inhibitor of viral infection. *Am J Transl Res* 1, 87 (2009).
 26. R M Molina; S-H Cha; W Chittick; S Lawson; M P Murtaugh; E A Nelson; **J Christopher-Hennings**; K-J Yoon; R Evans; R R R Rowland; et al. Immune response against porcine reproductive and respiratory syndrome virus during acute and chronic infection. *Vet. Immunol. Immunopathol.* 126, 283 (2008).
 27. Ying Fang; **Jane Christopher-Hennings**; Elizabeth Brown; Haixia Liu; Zhenhai Chen; Steven R Lawson; Rachael Breen; Travis Clement; Xiaofei Gao; Jingjing Bao; et al. Development of genetic markers in the non-structural protein 2 region of a US type 1 porcine reproductive and respiratory syndrome virus: implications for future recombinant marker vaccine development. *J. Gen. Virol.* 89, 3086 (2008).
 28. Ramon M Molina; Wayne Chittick; Eric A Nelson; **Jane Christopher-Hennings**; Raymond R R Rowland; Jeffrey J Zimmerman. Diagnostic performance of assays for the detection of anti-Porcine reproductive and respiratory syndrome virus antibodies in serum and muscle transudate ("meat juice") based on samples collected under experimental conditions. *J. Vet. Diagn. Invest.* 20, 735 (2008).
 29. Erin L Strait; Melissa L Madsen; F Chris Minion; **Jane Christopher-Hennings**; Matthew Dammen; Katherine R Jones; Eileen L Thacker. Real-time PCR assays to address genetic diversity among strains of *Mycoplasma hyopneumoniae*. *J. Clin. Microbiol.* 46, 2491 (2008).
 30. **Jane Christopher-Hennings**; Eric A Nelson; Gary C Althouse; Joan Lunney. Comparative antiviral and proviral factors in semen and vaccines for preventing viral dissemination from the male reproductive tract and semen. *Anim Health Res Rev* 9, 59 (2008).
 31. John Prickett; Robert Simer; **Jane Christopher-Hennings**; Kyoung-Jin Yoon; Richard B Evans; Jeffrey J Zimmerman. Detection of Porcine reproductive and respiratory syndrome virus infection in porcine oral fluid samples: a longitudinal study under experimental conditions. *J. Vet. Diagn. Invest.* 20, 156 (2008).

32. Diane R Baker; Rodney A Moxley; Mike B Steele; Jeffrey T Lejeune; **Jane Christopher-Hennings**; Ding-Geng Chen; Philip R Hardwidge; David H Francis. Differences in virulence among *Escherichia coli* O157:H7 strains isolated from humans during disease outbreaks and from healthy cattle. *Appl. Environ. Microbiol.* 73, 7338 (2007).
33. Albert Rovira; Travis Clement; **Jane Christopher-Hennings**; Bob Thompson; Mark Engle; Darwin Reicks; Claudia Muñoz-Zanzi. Evaluation of the sensitivity of reverse-transcription polymerase chain reaction to detect porcine reproductive and respiratory syndrome virus on individual and pooled samples from boars. *J. Vet. Diagn. Invest.* 19, 502 (2007).
34. Federico A Zuckermann; Esther Alvarez Garcia; Ivan Diaz Luque; **Jane Christopher-Hennings**; Alan Doster; Monica Brito; Fernando Osorio. Assessment of the efficacy of commercial porcine reproductive and respiratory syndrome virus (PRRSV) vaccines based on measurement of serologic response, frequency of gamma-IFN-producing cells and virological parameters of protection upon challenge. *Vet. Microbiol.* 123, 69 (2007).
35. X Wang; M Eaton; M Mayer; H Li; D He; E Nelson; **J Christopher-Hennings**. Porcine reproductive and respiratory syndrome virus productively infects monocyte-derived dendritic cells and compromises their antigen-presenting ability. *Arch. Virol.* 152, 289 (2007).
36. Ying Fang; Raymond R R Rowland; Michael Roof; Joan K Lunney; **Jane Christopher-Hennings**; Eric A Nelson. A full-length cDNA infectious clone of North American type 1 porcine reproductive and respiratory syndrome virus: expression of green fluorescent protein in the Nsp2 region. *J. Virol.* 80, 11447 (2006).
37. **Jane Christopher-Hennings**; Matthew Dammen; Eric Nelson; Raymond Rowland; Richard Oberst. Comparison of RNA extraction methods for the detection of porcine reproductive and respiratory syndrome virus from boar semen. *J. Virol. Methods* 136, 248 (2006).
38. Ying Fang; Kay S Faaberg; Raymond R R Rowland; **J Christopher-Hennings**; Asit K Pattnaik; Fernando Osorio; Eric A Nelson. Construction of a full-length cDNA infectious clone of a European-like Type 1 PRRSV isolated in the U.S. *Adv. Exp. Med. Biol.* 581, 605 (2006).
39. Wai-Hong Wu; Ying Fang; Raymond R R Rowland; Steven R Lawson; **Jane Christopher-Hennings**; Kyoung-Jin Yoon; Eric A Nelson. The 2b protein as a minor structural component of PRRSV. *Virus Res.* 114, 177 (2005).
40. Wesley Johnson; Michael Roof; Eric Vaughn; **Jane Christopher-Hennings**; Craig R Johnson; Michael P Murtaugh. Pathogenic and humoral immune responses to porcine reproductive and respiratory syndrome virus (PRRSV) are related to viral load in acute infection. *Vet. Immunol. Immunopathol.* 102, 233 (2004).
41. A Wasilk; J D Callahan; **J Christopher-Hennings**; T A Gay; Y Fang; M Dammen; M E Reos; M Torremorell; D Polson; M Mellencamp; et al. Detection of U.S., Lelystad, and European-like porcine reproductive and respiratory syndrome viruses and relative quantitation in boar semen and serum samples by real-time PCR. *J. Clin. Microbiol.* 42, 4453 (2004).
42. Susan L Ropp; Carrie E Mahlum Wees; Ying Fang; Eric A Nelson; Kurt D Rossow; Melissa Bien; Bill Arndt; Sarah Preszler; Pamela Steen; **Jane Christopher-Hennings**; et al. Characterization of emerging European-like porcine reproductive and respiratory syndrome virus isolates in the United States. *J. Virol.* 78, 3684 (2004).

43. Ying Fang; Dal-Young Kim; Susan Ropp; Pam Steen; **Jane Christopher-Hennings**; Eric A Nelson; Raymond R R Rowland. Heterogeneity in Nsp2 of European-like porcine reproductive and respiratory syndrome viruses isolated in the United States. *Virus Res.* 100, 229 (2004).
44. **Jane Christopher-Hennings**; Matthew A Dammen; Shelleen R Weeks; William B Epperson; Shri N Singh; Gina L Steinlicht; Ying Fang; Jessica L Skaare; Jill L Larsen; Janet B Payeur; et al. Comparison of two DNA extractions and nested PCR, real-time PCR, a new commercial PCR assay, and bacterial culture for detection of *Mycobacterium avium* subsp. paratuberculosis in bovine feces. *J. Vet. Diagn. Invest.* 15, 87 (2003).
45. Christopher J Kuckleburg; Christopher C Chase; Eric A Nelson; Salvatore A E Marras; Matthew A Dammen; **Jane Christopher-Hennings**. Detection of bovine leukemia virus in blood and milk by nested and real-time polymerase chain reactions. *J. Vet. Diagn. Invest.* 15, 72 (2003).
46. James E Benson; Michael J Yaeger; **Jane Christopher-Hennings**; Kelly Lager; Kyoung-Jin Yoon. A comparison of virus isolation, immunohistochemistry, fetal serology, and reverse-transcription polymerase chain reaction assay for the identification of porcine reproductive and respiratory syndrome virus transplacental infection in the fetus. *J. Vet. Diagn. Invest.* 14, 8 (2002).
47. Ying Fang; Wai-Hong Wu; Jessica L Pepper; Jill L Larsen; Salvatore A E Marras; Eric A Nelson; William B Epperson; **Jane Christopher-Hennings**. Comparison of real-time, quantitative PCR with molecular beacons to nested PCR and culture methods for detection of *Mycobacterium avium* subsp. paratuberculosis in bovine fecal samples. *J. Clin. Microbiol.* 40, 287 (2002).
48. W H Wu; Y Fang; R Farwell; M Steffen-Bien; R R Rowland; **J Christopher-Hennings**; E A Nelson. A 10-kDa structural protein of porcine reproductive and respiratory syndrome virus encoded by ORF2b. *Virology* 287, 183 (2001).
49. **J Christopher-Hennings**; L D Holler; D A Benfield; E A Nelson. Detection and duration of porcine reproductive and respiratory syndrome virus in semen, serum, peripheral blood mononuclear cells, and tissues from Yorkshire, Hampshire, and Landrace boars. *J. Vet. Diagn. Invest.* 13, 133 (2001).
50. T J Kaiser; **J Christopher-Hennings**; E A Nelson. Measurement of immunoglobulin G, A and M concentrations in boar seminal plasma. *Theriogenology* 54, 1171 (2000).
51. **J Christopher-Hennings**; E A Nelson; J K Nelson; K D Rossow; J L Shivers; M J Yaeger; C C Chase; R A Garduno; J E Collins; D A Benfield. Identification of porcine reproductive and respiratory syndrome virus in semen and tissues from vasectomized and nonvasectomized boars. *Vet. Pathol.* 35, 260 (1998).
52. **J Christopher-Hennings**; E A Nelson. PCR analysis for the identification of porcine reproductive and respiratory syndrome virus in boar semen. *Methods Mol. Biol.* 92, 81 (1998).
53. R W Wills; J J Zimmerman; K J Yoon; S L Swenson; M J McGinley; H T Hill; K B Platt; **J Christopher-Hennings**; E A Nelson. Porcine reproductive and respiratory syndrome virus: a persistent infection. *Vet. Microbiol.* 55, 231 (1997).

54. **J Christopher-Hennings**; E A Nelson; J K Nelson; D A Benfield. Effects of a modified-live virus vaccine against porcine reproductive and respiratory syndrome in boars. *Am. J. Vet. Res.* 58, 40 (1997).
55. K D Rossow; D A Benfield; S M Goyal; E A Nelson; **J Christopher-Hennings**; J E Collins. Chronological immunohistochemical detection and localization of porcine reproductive and respiratory syndrome virus in gnotobiotic pigs. *Vet. Pathol.* 33, 551 (1996).
56. **J Christopher-Hennings**; E A Nelson; R J Hines; J K Nelson; S L Swenson; J J Zimmerman; C L Chase; M J Yaeger; D A Benfield. Persistence of porcine reproductive and respiratory syndrome virus in serum and semen of adult boars. *J. Vet. Diagn. Invest.* 7, 456 (1995).
57. **J Christopher-Hennings**; I D Kurzman; A L Haffa; J W Kemnitz; E G Macewen. The effect of high fat diet and dehydroepiandrosterone (DHEA) administration in the rhesus monkey. *In Vivo* 9, 415 (1995).
58. R Magar; R Larochelle; S Dea; C A Gagnon; E A Nelson; **J Christopher-Hennings**; D A Benfield. Antigenic comparison of Canadian and US isolates of porcine reproductive and respiratory syndrome virus using monoclonal antibodies to the nucleocapsid protein. *Can. J. Vet. Res.* 59, 232 (1995).
59. **J Christopher-Hennings**; E A Nelson; J K Nelson; R J Hines; S L Swenson; H T Hill; J J Zimmerman; J B Katz; M J Yaeger; C C Chase. Detection of porcine reproductive and respiratory syndrome virus in boar semen by PCR. *J. Clin. Microbiol.* 33, 1730 (1995).
60. K D Rossow; J E Collins; S M Goyal; E A Nelson; **J Christopher-Hennings**; D A Benfield. Pathogenesis of porcine reproductive and respiratory syndrome virus infection in gnotobiotic pigs. *Vet. Pathol.* 32, 361 (1995).
61. E A Nelson; **J Christopher-Hennings**; D A Benfield. Structural proteins of porcine reproductive and respiratory syndrome virus (PRRSV). *Adv. Exp. Med. Biol.* 380, 321 (1995).
62. E A Nelson; **J Christopher-Hennings**; D A Benfield. Serum immune responses to the proteins of porcine reproductive and respiratory syndrome (PRRS) virus. *J. Vet. Diagn. Invest.* 6, 410 (1994).
63. E A Nelson; **J Christopher-Hennings**; T Drew; G Wensvoort; J E Collins; D A Benfield. Differentiation of U.S. and European isolates of porcine reproductive and respiratory syndrome virus by monoclonal antibodies. *J. Clin. Microbiol.* 31, 3184 (1993).
64. **J Christopher-Hennings**; J A Willgohs; D H Francis; U A Raman; R A Moxley; D J Hurley. Immunocompromise in gnotobiotic pigs induced by verotoxin-producing *Escherichia coli* (O111:NM). *Infect. Immun.* 61, 2304 (1993).

Non-PubMed Publications

1. Clement, T., A. Singrey, S. Lawson, F. Okda, J. Nelson, D. Diel, E.A. Nelson, J. Christopher-Hennings. 2016. Quantitation of porcine epidemic diarrhea virus neutralizing antibodies in sow serum, colostrum, milk and piglet serum after feedback. *J. Swine Health and Production* 24:147-153.
2. Stricker A. D Polson, M Murtaugh.; et Variation in porcine reproductive and respiratory syndrome virus open reading frame 5 diagnostic sequencing. 2015. *Swine Health and Production* 23:18-27.

3. National Hog Farmer, Biofilters can reduce spread of PRRS virus, Nicolai, D., E.A. Nelson, **J. Christopher-Hennings**, B. Thaler and S. Pohl. Dec. 15, 2009. P. 23-25.
4. Reicks DL, C. Muñoz-Zanzi, W. Mengeling **J. Christopher-Hennings**, K. Lager, D. Polson, S. Dee, K. Rossow. 2006. Detection of porcine reproductive and respiratory syndrome virus in semen and serum of boars during the first six days after inoculation. *Swine Health and Production* 14(1):35-41.
5. **Christopher-Hennings, J.**, K.S. Faaberg, W.L. Mengeling, M.P. Murtaugh, E.A. Nelson, M.B. Roof, E.M. Vaughn, K.-J. Yoon and J.J. Zimmerman. 2002. PRRS diagnostic: Interpretation and limitations. *Swine Health and Production* 10:213-218.
6. **Christopher-Hennings, J.**, E.A. Nelson and D.A. Benfield. 1996. Detecting PRRSV in boar semen. *Swine Health and Production* 4:37-39.
7. Yaeger, M. J., T. Prieve, J. Collins, **J. Christopher-Hennings**, E. Nelson and D. A. Benfield. 1993. Evidence for the transmission of porcine reproductive and respiratory syndrome (PRRS) virus in boar semen. *Swine Health and Production*. 1:7-9.
8. Benfield, D. A., L. Harris, E. Nelson, **J. Christopher-Hennings**, J. Collins, D. Chladek, W. Christianson, R. Morrison, D. Gorycyca. 1992. Properties of SIRS virus isolate ATCC VR-2332 in the United States and preliminary characterization of a monoclonal antibody to this virus. *American Association of Swine Practitioners Newsletter* 4(4):19-21.
9. Kritchevsky J.E., Stevens D. L., **Christopher-(Hennings) J.**, and Cook W. O., Peritoneal dialysis for presurgical management of ruptured bladder in a foal. 1984. *Journal of the American Veterinary Medical Association* 185:81-82.

Book Chapters

1. **Christopher-Hennings J.**, G. Erickson, R. Hesse, Simone Oliveira, E. Nelson. 2012. Diagnostic tests, test performance and considerations for interpretation. In: *Diseases of Swine* (10th edition). Wiley-Blackwell, Inc., p 77-93.
2. Fang, Y., K.S. Faaberg, **J. Christopher-Hennings**, R.R. Rowland, A.K. Pattnaik, F.A. Osorio and E.A. Nelson. 2006. Construction of a European-like type 1 PRRSV full-length cDNA infectious clone identified in the United States, in: *The Nidoviruses: The Control of SARS and Other Nidovirus Diseases*. Pearlman and Holmes (editors) Springer Publishers, Adv. Exp. Med. Bio. 581:605-608.
3. Yoon, K.-J., **J. Christopher-Hennings** and E.A. Nelson. 2003. Diagnosis of PRRS virus. In: *2003 PRRS Compendium – Chapter 7*. J. Zimmerman, K.-J. Yoon and E. Neumann, eds. National Pork Board.
4. Yoon, K.-J., **J. Christopher-Hennings** and E.A. Nelson. 2003. Diagnosis of PRRS virus. In: *2003 PRRS Compendium – Producer Edition*. J. Zimmerman, K.-J. Yoon and E. Neumann, eds. National Pork Board.
5. **Christopher-Hennings J.** and E. A. Nelson. PCR analysis for the identification of porcine reproductive and respiratory syndrome virus in boar semen. In: *PCR in Bioanalysis*. Walker, J. M. ed. Humana Press (Methods in Molecular biology Series). p. 81-88, 1998.
6. Nelson, E. A., **J. Christopher-Hennings**, D. A. Benfield. 1995. Structural proteins of porcine reproductive and respiratory syndrome virus. In: Talbot, P. J. and Levy, G. A., eds. *Corona and Related Viruses*. New York: Plenum Publishing Corporation. p. 232-234.

Invited Presentations

Christopher-Hennings, J. 2014. Latest Knowledge on PEDv and PDCoV diagnostics, 3rd Annual China Leman Conference, Xian, China.

Christopher-Hennings J. 2014. Overview of U.S. Veterinary Diagnostic Laboratories and their linkage with the “field” . 3rd Annual China Leman Conference, Xian, China

Clement T, **J. Christopher-Hennings.** 2013. Maximizing sequencing success in the VDL. American Association of Swine Veterinarians, San Diego, CA.

Christopher-Hennings J. 2012. Boehringer-Ingelheim PRRSV Research Meeting of Experts in PRRSV. Colorado Springs, CO.

Christopher-Hennings J. 2012. Johne’s Disease Diagnostics. South Dakota Veterinary Medical Association Annual Meeting. Rapid City, SD.

Christopher-Hennings J. 2012. Plenary Lecture. Considerations for performing Luminex multiplex assays in Veterinary Diagnostic Laboratories. American Association Of Veterinary Laboratory Diagnosticians. Greensboro, NC.

Christopher-Hennings J. 2012. Southeast SD Area Regional PRRS Control Meetings, Sampling and Testing for PRRSV. June 19, 20th in Lennox, SD and Mitchell SD.

Christopher-Hennings J. 2011. Optimizing the intersections of veterinary and human health: Past and present successes and future possibilities. Sanford Health PROMISE Community Lecture Series. Sioux Falls, SD.

Christopher-Hennings J., 2011. Design and use of multiplexed swine-specific assays for veterinary and biomedical advances. Luminex Corp, Planet xMAP Workshop series. Rush University, Chicago, IL.

Christopher-Hennings J., 2011. Porcine Reproductive and Respiratory Syndrome Virus (PRRSV) Diagnostics, Past, Present, Future. North Central Conference of Veterinary Laboratory Diagnosticians (NCCVLD), Brookings, SD.

Christopher-Hennings J., Fuhman M. 2011. Experience with Hutterite colonies in South Dakota and swine influenza diagnostics and control. American Association of Swine Veterinarians, Phoenix, AZ

Lawson S., **J. Christopher-Hennings.** 2010. Development of swine-specific multiplexed assays for veterinary and biomedical advances. 2nd Bio-plex Users Group Meeting, Winnipeg, Manitoba, Canada.

Christopher-Hennings J., 2010. Development of swine-specific multiplexed assays for veterinary and biomedical advances. Planet xMAP Europe Conference, Vienna, Austria.

Christopher-Hennings J. 2010. Diagnosis and Control of Porcine Reproductive and Respiratory Syndrome Virus. Swine Production Shortcourse for Chinese faculty, swine company representatives, producers and managers. Sponsored by the US Grains Council, Brookings, SD.

Christopher-Hennings J. 2010. Lead Speaker. Progress in Porcine Reproductive and Respiratory Syndrome Virus (PRRSV): What we know about PRRSV, from basic to applied science: A Historical perspective". International Pig Veterinary Society, Vancouver, Canada.

Christopher-Hennings J. 2009. Keynote: Innovations in Veterinary Medicine and Diagnostics: A (brief) history and future possibilities. Carlos Pijoan International Symposium, New Approaches to Herd Diagnostics, St. Paul, MN.

Christopher-Hennings J. 2009. Antigen detection in swine diagnostic and swine cytokine analysis using the Luminex system. Development and implementation of a multiplex microsphere immunoassay (MIA) platform for swine diagnostics Meeting, National Pork Board, Des Moines, IA.

Christopher-Hennings J. 2006. Porcine Reproductive and Respiratory Syndrome Virus: Room for research in the immunology of the boar (male) reproductive tract. American Association of Veterinary Immunologists/American College of Veterinary Microbiologists in association with the Conference for Research Workers in Animal Diseases, Chicago, IL.

Rovira A., T. Clement, **J. Christopher-Hennings**, C. Munoz-Zanzi, K. Rossow, N. Loskutoff, E. Nelson, B. Thompson, M. Engle, D. Reicks, M. Murtaugh, J. Lunney. PRRSV surveillance, elimination and immunity in boars and boar semen. 2006 International PRRS Symposium, Chicago, IL, p. 19.

Christopher-Hennings J. 2006. Boar Stud Issues: PRRSV diagnostics for boar studs and methodology of SDSU PRRSV PCR. American Association of Swine Veterinarians. Kansas City, MO.

Christopher-Hennings J. 2004. Using Molecular Diagnostics for the Detection and Evaluation of Infectious Diseases. South Dakota Veterinary Medical Association.

Christopher-Hennings J. 2004. PRRSV and diagnosis of PRRSV in boars. Newport Laboratories, Worthington, MN (May 4);

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Christopher-Hennings J. 2003. Development, validation and commercialization of a real-time PCR for the detection of Lelystad/European and U.S. PRRSV. Invited presentation sponsored by Intervet, bi-monthly, North Carolina Swine Veterinarian Meeting, Raleigh, NC.

Christopher-Hennings J. 2002. Timeline of Infection and Detection of PRRSV in the Boar. A. Leman Swine Conference, St. Paul, MN.

Christopher-Hennings J. 2001. Molecular Diagnostics: What is available and how they work. American Association of Swine Veterinarians. Nashville, TN.

Christopher-Hennings J. 2000. Reproductive Diseases in Swine. American Association of Swine Practitioners, Indianapolis, IN.

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Additional Presentations and Abstracts

1. Lawson, S.R., A. Singrey, D.G. Diel, J. Leat, L.R. Joshi, J. Nelson, J. Christopher-Hennings, E.A. Nelson. Development of reagents and assays for Senecavirus A serodiagnosis. Proc. 59th Ann. Meet. American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, Oct. 2016. p.219.
2. Joshi, L.R., S.R. Lawson, M.H.V. Fernandes, J. Christopher-Hennings, E.A. Nelson, D.G. Diel. Serological responses to Senecavirus A infection in pigs. Proc. 59th Ann. Meet. American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, Oct. 2016. p.125.
3. Dee, S., C. Neill, A. Singrey, T. Clement, R. Cochrane, C. Jones, G. Patterson, G. Spronk, J. Christopher-Hennings, E. Nelson. Modeling the transboundary risk of feed ingredients contaminated with porcine epidemic diarrhea virus. American Assoc. of Swine Veterinarians. Feb. 27-Mar 1, 2016. New Orleans, LA. P. 421.
4. Thomas, M., A. Thachil, S. Ghimire, A. Glaser, A. Pillatzki, E. Nelson, J. Christopher-Hennings, R. Daly, J. Scaria. Genotypic and phenotypic characterization of Salmonella enterica serovar Dublin in cattle. Proc. 59th Ann. Meet. American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, Oct. 2016.
5. Dee, S., C. Neill, A. Singrey, T. Clement, A. Singrey, J. Christopher-Hennings, E. Nelson. An evaluation of porcine epidemic diarrhea virus survival in individual feed ingredients in the presence or absence of a liquid antimicrobial. American Assoc. of Swine Veterinarians. Feb. 27-Mar 1, 2016. New Orleans, LA. P.54-56.
6. Dee, S. C. Neill, T. Clement, A. Singrey, J. Christopher-Hennings, E. Nelson. An evaluation of porcine epidemic diarrhea virus survival in individual feed ingredients in the presence or absence of a liquid antimicrobial. NA PRRS Symposium, Dec. 5-6, 2015, Chicago, IL, P 85.
7. Lawson, S., F. Okda, X. Liu, A. Singrey, T. Clement, J. Christopher-Hennings, E.A. Nelson. Development of indirect and blocking ELISAs for detection of antibodies against porcine

- epidemic diarrhea virus (PEDV). 23rd Congress of the International Pig Veterinary Society, June 8-11, 2014, Cancun, Mexico. Abstract #1937.
8. Singrey, A., S. Lawson, F. Okda, X. Liu, T. Clement, J. Nelson, J. Christopher-Hennings, E.A. Nelson. Development and diagnostic application of monoclonal antibodies to porcine epidemic diarrhea virus (PEDV). 23rd Congress of the International Pig Veterinary Society, June 8-11, 2014, Cancun, Mexico. Abstract #1938.
 9. Nelson, J., F. Okda, R. Parmar, A. Singrey, S. Lawson, X. Liu, J. Christopher-Hennings, E.A. Nelson. Environmental stability of a cell culture adapted U.S. isolate of porcine epidemic diarrhea virus (PEDV). 23rd Congress of the International Pig Veterinary Society, June 8-11, 2014, Cancun, Mexico. Abstract #1940.
 10. Caya, I., M. Bertrand, A. Broes, S. Lawson, E.A. Nelson, J. Christopher-Hennings. Development of an indirect enzyme-linked immunosorbent assay (ELISA) for detection of antibodies against porcine epidemic diarrhea virus (PEDV). AAVLD, Kansas City, MO, Oct. 2014. p.191.
 11. Lawson, S. F. Okda, X. Liu, A. Singrey, T. Clement, J. Christopher-Hennings, E.A. Nelson. Development of a fluorescent microsphere immunoassay (FMIA) and a blocking ELISA for detection of antibodies against porcine epidemic diarrhea virus (PEDV). AAVLD, Kansas City, MO, Oct. 2014. p.193.
 12. Singrey, A., S. Lawson, F. Okda, X. Liu, T. Clement, J. Nelson, J. Christopher-Hennings, E.A. Nelson. Development and diagnostic application of monoclonal antibodies against porcine epidemic diarrhea virus (PEDV). AAVLD, Kansas City, MO, Oct. 2014. p.192.
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 14. Dee, S., C. Neill, T. Clement, J. Christopher-Hennings, E. Nelson. An evaluation of a liquid antimicrobial (Sal CURB®) for reducing the risk of porcine epidemic diarrhea virus infection of naïve pigs during consumption of contaminated feed. North American PRRS Symposium, Chicago, IL, Dec. 2014. p.117.
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 16. Dee, S., T. Clement, J. Christopher-Hennings, E. Nelson. Assessing the viability of porcine epidemic diarrhea virus in dry feed at 4 degrees C. North American PRRS Symposium, Chicago, IL, Dec. 2014. p.119.
 17. Singrey, A., S. Lawson, F. Okda, K. Hain, T. Clement, J. Christopher-Hennings, E.A. Nelson. Development of monoclonal antibodies and other reagents for detection of porcine deltacoronavirus (PDCoV). North American PRRS Symposium, Chicago, IL, Dec. 2014. p.53.
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 19. Lawson, S., F. Okda, X. Liu, A. Singrey, T. Clement, **J. Christopher-Hennings**, E.A. Nelson. Development of an indirect ELISA, a fluorescent microsphere immunoassay (FMIA) and a

- blocking ELISA for detection of antibodies against porcine epidemic diarrhea virus (PEDV). North American PRRS Symposium, Chicago, IL, Dec. 2014. p.48.
20. Singrey, A., S. Lawson, F. Okda, K. Hain, T. Clement, **J. Christopher-Hennings**, E.A. Nelson. Development of monoclonal antibodies and other reagents for detection of porcine deltacoronavirus (PDCoV). 95th Conference of Research Workers in Animal Diseases, Chicago, IL, Dec. 2014. 083P.
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 - c. Huazhong Agriculture University, Wuhan, China
 - d. Northwest Forestry and Agriculture University, Xian, China
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106. Rossow K., J. Collins, S. Goyal, **J. Hennings**, E. A. Nelson and D. A. Benfield. 1995. The pathogenesis of porcine reproductive and respiratory syndrome virus in gnotobiotic pigs. Abstract, American Society of Veterinary Clinical Pathologists.
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- chain reaction. Abstract, 75th Conference of Research Workers in Animal Disease. Chicago, IL.
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 115. Chae, C., R. A. Moxley, **J. Christopher-Hennings**, D. H. Francis, and M. J. Wannemuehler. 1994. Shiga-like Toxin-II-Producing Escherichia coli O157:H7 Infection in Gnotobiotic Piglets: Protection against Brain Vascular Lesions with SLT-II Antiserum. Abstract, 2nd International Symposium and Workshop on "Verotoxin (Shiga-like toxin)-Producing Escherichia coli Infections", Bergamo, Italy.
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 120. Nelson E. A., **J. Christopher-Hennings**, L. Harris, J. E. Collins, D. W. Chladek, D. Gorcyca, D. A. Benfield. 1992. Preliminary characterization of monoclonal antibodies to a United States isolate (ATCC VR-2332) of porcine epidemic abortion and respiratory syndrome virus. 12th Congress. International Pig Veterinary Society. The Hague, The

Netherlands and International Symposium on Swine Infertility and respiratory syndrome, St. Paul, MN.

121. Benfield, D., L. Harris, E. Nelson, **J. Christopher-Hennings**, J. Collins, D. Chladek, W. Christianson, R. Morrison, and D. Gorcyca. 1992. Properties of SIRS virus isolate ATCC VR-2332 in the United States and preliminary characterization of a monoclonal antibody to this virus. American Assoc. Swine Practitioners, International PRRS Symposium Edition, 4:19-21.
122. Chae, C., R. A. Moxley, **J. Christopher-Hennings**, D. H. Francis, M. Wannemuehler. 1992. Shiga-like toxin II producing Escherichia coli 0157:H7 infection in gnotobiotic piglets: protection against brain vascular lesions with anti-SLT-II serum. Abstract, 73rd Conference of Research Workers in Animal Disease. Chicago, IL.
123. Collins, J. E., D.A. Benfield, E. A. Nelson, W.T. Christianson, L. Harris, D. P. Shaw, **J. Christopher-Hennings**, S. M. Goyal, D. Gorcyca, R.B. Morrison, D. Chladek. 1992. Swine Infertility and respiratory syndrome (SIRS) in North America: Experimental reproduction and characterization of SIRS virus (isolate ATCC-VR2332). Abstract, VIth International Symposium, World Association of Veterinary Laboratory Diagnosticians.
124. **Christopher-Hennings, J.**, Willgohs, J.A., Francis, D.H. Raman, U.A.K., Hurley, D.J. 1991. Immunosuppression in gnotobiotic piglets caused by verotoxin producing Escherichia coli (0111:NM). 72nd Conference of Research Workers in Animal Disease. Chicago, IL.
125. Hurley, D.J., Raman, U.A.K., **Christopher-Hennings J.**, 1991. Immunosuppression observed in gnotobiotic piglets during infection with verotoxin producing E. coli (0111:NM) is caused by the superantigen activity of Shiga-like toxin I. South Dakota Academy of Sciences, Vermillion, SD.
126. Faulstich, C.S., Hildreth, M.B., **Christopher-Hennings, J.**, Zeman, D.H., Francis, D.H. 1991. Preliminary effects of combined Escherichia coli and Isospora suis infection in gnotobiotic pigs. South Dakota Academy of Sciences, Vermillion, SD.

Major Advisor for Graduate Students:

1. Troy Kaiser, 1998, Thesis: "Effects of intranasal vaccination with RespPRRS modified-live virus vaccine in boars" (Thesis advisor);
2. Chris Kuckelburg 2001, Thesis: "Evaluation of nested and real-time PCR for the detection of bovine leukemia virus in blood and milk specimens";
3. Jessica Skaare, 2002, Thesis: "Detection and quantitation of Mycobacterium avium subspecies paratuberculosis in bovine and bison using real-time molecular beacon PCR";
4. Aimee Wasilk, 2004, Thesis: "Detection, predictors and immune mechanisms of PRRSV persistence in boars".
5. Travis Clement 2006-2008, Thesis: "PRRSV surveillance, elimination and immunity in boars and boar semen".
6. Lindsey Reister 2007-2009, Thesis: "Elimination of PRRSV from semen: "On Farm" Mechanical and Antiviral Methods".

Veterinary and Biomedical Sciences Department Graduate Representative (selected since 2010):

1. Michael Steele (MS in Biological Sciences, Veterinary Pathobiology) 2010.
2. Lisa Baxter (PhD in Biological Science) 2010.
3. Sun Zhi (PhD in Veterinary and Biomedical Sciences; Veterinary Microbiology) 2011
4. Robert Langenhorst (MS in Veterinary and Biomedical Sciences; Veterinary Microbiology); 2012.

Served on numerous Graduate Faculty Committees as a Graduate Faculty Representative for various departments including, Biology/Microbiology, Engineering, Education, Mathematics.

Teaching (Undergraduate Courses)

1. Honor's undergraduate Colloquium: "One Health" Achieving human, animal, agronomic, environmental and economic global well being" Spring 2014..
2. Honor's 303 Class, Agriculture and Global Health Honor's Colloquium, Spring 2013, originated idea and obtained grant funding, Lead Instructor.

Teaching (Graduate Courses)

1. Agriculture and Biological Sciences (ABS) 705, Graduate Course on Research Methodology, PCR and Related Techniques, 3 credits, Spring 2009 to present.
2. Veterinary Science 792, Graduate and Undergraduate Independent Study class on BioRad/Bioplex/Luminex technology, 3 credits. Topic started in Spring 2009 (continued as needed).
3. Veterinary Science 792, Graduate and Undergraduate Independent Study Class on Molecular Diagnostics/PCR Methodology 3 credits 1999 to 2009.
4. Biological Science 663, Lecturer, co-taught course on Infectious Diseases 2006 to 2011.
5. Veterinary Clinical Microbiology 703-02 Colloquium Course, Fall 2002

Intellectual Property: License Agreements

1. Multiplex immune effector molecule assay—Swine cytokines. Developed by Christopher-Hennings, Lawson, Fang and Nelson.
2. Development of lateral flow pathogen detection assays using monoclonal antibodies against PRRSV and other viral pathogens. Tetracore, Inc. E.A. Nelson and J. Christopher-Hennings.
3. PRRSV real-time PCR with Tetracore, Inc., Rockville, NJ
4. Johne's (*Mycobacterium avium* subsp *paratuberculosis*) real-time PCR with Tetracore. Inc., Rockville, NJ

Intellectual Property: Patent Applications

1. Multiplex immune effector molecule assay. **J. Christopher-Hennings**, S. Lawson, Y. Fang and E. Nelson. Licensed Technology with Life Technologies, Carlsbad, CA. Patent Pending (Application number PCT/US2011/039874).
2. Recombinant North American type 1 porcine reproductive and respiratory syndrome virus and methods of use. Fang, Y., E.A. Nelson and **J. Christopher-Hennings**. U.S. patent # 8182984. Issued May 22, 2012.

Funded Grant Proposals

1. Li, F., T. Clement, **J. Christopher-Hennings**, E.A. Nelson, R. Rauh, B. Hause. Detection and differentiation of influenza Types A, B, C and D in swine. Swine Health Information Center. 11/16 to 11/17.
2. Diel, D., T. Clement, S. Lawson, F. Bauermann, **J. Christopher-Hennings**, E.A. Nelson, R. Rauh. Development of rapid diagnostic capability for encephalomyocarditis virus. Swine Health Information Center. 11/16 to 11/17.
3. **Christopher-Hennings, J.**, M. Chaussee, D. Diel, S. Herrmann, F. Li, E. Nelson, J. Scaria, K. Kattelman, D. Wang. South Dakota Center for Biologics Research-Planning Grant. South Dakota Governor's Office of Economic Development. 7/16 to 6/17.
4. Lawson, S., A. Singrey, T. Clement, D. Diel, **J. Christopher-Hennings**, E.A. Nelson. Development of reagents and serological assays for Seneca Valley Virus. Swine Health Information Center. 10/15 to 4/16.
5. Diel, D., T. Clement, E.A. Nelson, **J. Christopher-Hennings**, L. Caron, R. Shaefer. Characterization of Seneca Valley Virus circulating in the U.S. and Brazil. Swine Health Information Center. 10/15 to 4/16.
6. Diel, D., E.A. Nelson, **J. Hennings**, A. Pillatzki. Development of a multivalent vector platform to control swine enteric coronavirus disease. National Pork Board. 4/15 to 4/16.
7. Eric A. Nelson, Aaron Singrey, Steven Lawson, Travis Clement and **J Christopher-Hennings**. PEDV diagnostic approaches to assess sow immunity and piglet protection. National Pork Board General RFP, 5/1/14 to 4/30/15.
8. Dee, S., E. Nelson, D. Diel, T. Clement, A. Singrey, **J. Hennings**. An evaluation of a shipping model to investigate foreign animal disease introduction into the USA. American Association of Swine Veterinarians. 3/16 to 2/17.
9. Thaler, B., C. Lavesque, **J Christopher-Hennings**, E. Nelson, J. Clapper. Efficacy of soybean meal in reducing the effect of a PRRSV challenge in pigs. South Dakota Soybean and Promotion Council FY15. July 2014-July 2015.

10. Nelson, E.A., S. Lawson, A. Singrey, T. Clement, **J. Christopher-Hennings**. Development of reagents and serological assays for Porcine Deltacoronavirus (PDCoV). National Pork Board.
11. Diel, D., H. Vu, F. Osorio, E.A. Nelson, **J Christopher-Hennings**. Evaluation of immunodominant B- and T-cell epitopes as inducers of protective immunity against porcine reproductive and respiratory syndrome virus. National Pork Board.. Submitted 5-21-14. Oct. 1, 2014-Sept. 31, 2015.
12. Diel, D., E.A. Nelson, **J. Hennings**, A. Pillatzki. A novel platform for the development of live attenuated vaccine candidates for porcine epidemic diarrhea virus. National Pork Board. (year 1). Submitted Nov. 17, 2014.
13. Diel, D., E.A. Nelson, **J. Hennings**, A. Pillatzki. Development of a multivalent vector platform to control swine enteric coronavirus disease. National Pork Board. Submitted Nov. 17, 2014.
14. **Christopher-Hennings J**, B Thaler, E VanDerSluis. 2013. Honor's Colloquium 303 on One Health" Achieving human, animal, agronomic, environmental and economic global well being" Honors in Agriculture Mini-Grant, South Dakota State University.
15. **Christopher-Hennings J** 2012. Diagnostic surveillance for unknown or incompletely defined pathogens through the Animal Disease Research and Diagnostic Laboratory, Veterinary and Biomedical Sciences Department, South Dakota State University. Department of Homeland Security and Center of Excellence for Emerging and Zoonotic Diseases (CEEZAD). September 2012-2013.
16. **Christopher-Hennings J**, B Thaler, E VanDerSluis. 2012. Honor's Colloquium 303 on Agriculture and Global Health. Honors in Agriculture Mini-Grant, South Dakota State University.
17. Laegreid W., F. Osorio, T. Goldberg, **J. Christopher-Hennings**, E. Nelson. Immunological consequences of PRRSV Diversity. USDA-NRI, PRRSV CAP2. 2009-2013.
18. Zimmerman J, Y Fang, **J Christopher-Hennings**, E Nelson, T Opriessnig, R Rowland, K-J Yoon. 2012. Generating swine influenza virus (SIV) oral fluid diagnostic Reference Standards for community use. National Pork Board.
19. Fang Y., W. Zhang, **J. Christopher-Hennings**, E.A. Nelson and R.B. Baker. 2012. Development of an epitope-based vaccine against swine influenza A using a non-toxic enterotoxin as the carrier-adjuvant. National Pork Board.
20. Nelson, E.A., **J. Christopher-Hennings**, Y. Fang. 2012. Improved methods for the diagnosis of Porcine Reproductive and Respiratory Syndrome and other important viral diseases of swine. USDA Hatch.
21. **Christopher-Hennings J**, E Nelson, Y Fang, G Erickson, V Huber, H Harris. 2011. An alternative to hemagglutination inhibition (HI) assays for the simultaneous detection of multiple swine influenza subtype antibodies. Animal Disease Research and Diagnostic Laboratory, Veterinary and Biomedical Sciences Department.

22. Fang Y, J Zimmerman, C Irwin, **J Christopher-Hennings**, E Nelson. 2011. Novel multiplex diagnostic assays development for diagnosis of porcine respiratory disease complex. National Pork Board.
23. Reicks D, **J Christopher-Hennings**, E Nelson. 2011. The effect of PRRSV MLV vaccine given by exposure to vaccine saturated ropes. Annual Advancement in PRRSV Research Award, Boehringer-Ingelheim Animal Health 2011.
24. **Christopher-Hennings J**. International Planet xMAP Conference Presentation Travel Grant, Vienna, Austria. "Prosperity Through Innovation" (Proof of Concept) Grant, U.S. Small Business Association, 2010.
25. Lunney **J**, **Christopher-Hennings J**, Nelson E, Steibel JP, Zimmerman. Comparison of early immune responses of pigs which are genetically PRRS resistant/tolerant using a swine-specific immune protein (cytokine) multiplex assay. National Pork Board. 2009-2010.
26. Fang Y, **Christopher-Hennings J**, Nelson E, Zimmerman J, Murtaugh M. Development of diagnostic assays for detecting PRRSV infection using oral fluid samples as an alternative to serum-based assays. National Pork Board, 2009-2010.
27. **Christopher-Hennings J**, E. Nelson, Y, Fang, J. Lunney. Development of a rapid, swine-specific test to simultaneously detect multiple immune proteins (cytokines) affected by PRRSV infection. National Pork Board, submitted. \$101,107.
28. Zhang, W., **J. Christopher-Hennings**. Pathogenesis of EAST1 toxin in ETEC associated diarrhea disease. NIH R15, 9-1-2009 to 8-31-2011.
29. **Christopher-Hennings J**, Y. Fang, E.A. Nelson. Elimination of Porcine Reproductive and Respiratory Syndrome Virus from semen: "On Farm" Mechanical and Antiviral Methods. 2007-2008.
30. **Christopher-Hennings J**, Acquisition of the Bio-Plex suspension Array system for multiplex assay development in swine research. Mucosal immunity to porcine reproductive and respiratory syndrome virus in the boar reproductive tract. USDA-NRI Equipment Grant.
31. Faaberg K., **J. Christopher-Hennings**, J. Collins, E. Retzel. Implementation of a PRRSV database-Renewal. National Pork Board. 2006-2007.
32. **Christopher-Hennings J**. C. Munoz-Zanzi, N. Loskutoff, J. Lunney, E. Nelson. PRRSV surveillance, elimination and immunity in boars and boar semen. USDA-NRI Integrated Program. April 2006—January 2008.
33. Nelson E.A., R.R.R. Rowland, **J. Christopher-Hennings**. Emerging European-like PRRSV in the U.S.: Implications for diagnostic and control strategies. National Pork Board. Jan 2005-Jan 2006.

34. Fang Y., D Benfield, R. R. R. Rowland, **J. Christopher-Hennings**, E.A. Nelson. Accurate ELISA test development for PRRSV serology: evaluation of cysteine protease domains of nsp2 as potential diagnostic targets. National Pork Board, Aug 2005-Aug 2006.
35. Wang X, W. Cafruny, Y. Fang, R. Kaushik, **J. Christopher-Hennings**, E.A. Nelson. Improved diagnostic and vaccination strategies for PRRSV. SD 2010 Program (CIDRV), Oct 2004-Oct 2006.
36. Rowland, R.R., J. Zimmerman, R. Evans, **J. Christopher-Hennings**, E.A. Nelson and D.A. Benfield. Management of PRRS Persistence: Identification of persistently infected swine. USDA-NRI Integrated Program. Sept. 2004 to Sept. 2005. .
37. Wang, X., W. Bowers, E.A. Nelson and **J. Christopher-Hennings**. A Novel herpesvirus vector approach for PRRSV vaccines. National Pork Board. Sept. 2004 to Sept. 2005..
38. Murtaugh et. al. Integrated control and elimination of porcine reproductive and respiratory syndrome virus (PRRSV) in the U.S. USDA-NRI Integrated Program. March 2004-Dec 2007.
39. **Christopher-Hennings J.**, E. A. Nelson. 2002-2004. Porcine Reproductive and Respiratory Syndrome Virus detection, protection and elimination of virus. Agriculture Experiment Station.
40. **Christopher-Hennings J.** E. A. Nelson. Detection, Predictors, Immune Mechanisms and Prevalence of PRRSV Persistence in Boars. Iowa Pork Producers Council. 2002. .
41. **Christopher-Hennings J.** E. A. Nelson. Development and validation of a real-time, quantitative PCR for the detection of PRRSV in boar semen and serum. PIC, Boehringer-Ingelheim Vetmedica, Tetracore, Inc. 2002-2003.
42. **Christopher-Hennings J.**, E.A. Nelson, B. Epperson, C. Chase, D. Henning. Johnes's Disease in Cattle and Buffalo: A South Dakota Concern. Agricultural Experiment Station Cooperative Grants Program. 2000-2002.
43. Nelson E. A., M. Murtaugh, **J. Christopher-Hennings**. Evaluation of a blocking ELISA to verify suspect false positive PRRSV serology results. Pig Improvement Company (PIC-USA). November 1, 2000 to October 31, 2001.
44. Kuckleburg C, **J Christopher-Hennings**. Using PCR for the Early Detection of a Bovine Retrovirus in the Milk of Normal and Transgenic Cattle. South Dakota State University Research Support Fund. 1998-1999.
45. **Christopher-Hennings J.** E.A. Nelson. Breed and Litter Factors related to PRRSV Persistence and Clearance. National Pork Producers Council. 1999-2000. .
46. **Christopher-Hennings J.**, E. A. Nelson, D. A. Benfield. Acquisition of an ABI PRISM 7700 Sequence Detection System. USDA, National Research Initiative Equipment Grant. September 1, 1998.
47. Rossow K. D., **J. Christopher-Hennings**, J. Collins, D. A. Benfield, E. A. Nelson, W. Epperson. Porcine reproductive and respiratory syndrome virus infection characterized by marked

neurovirulence in neonatal pigs: fetal challenge in late-gestation sows. National Pork Producers Council. 1997.

48. Nelson E. A., **J. Christopher-Hennings**. Envelope proteins of PRRSV and their role in antigenic variation. USDA, National Research Initiative. October 1, 1996 to September 30, 1999.
49. Benfield D. A., R. R. Rowland, **J. Christopher-Hennings**, E. A. Nelson, J. K. Nelson: Development of a quantitative PCR to evaluate the risk of boar semen as a source of PRRS virus. National Pork Producers Council Grant, 1995 to 1998.
50. **Christopher-Hennings, J.**, E. A. Nelson, D. A. Benfield. Evaluation of intranasal vaccination for PRRSV and the mucosal immune response in the boar. South Dakota Pork Producers Council. September 1996 to September 1997.
51. **Christopher-Hennings J.**, E. A. Nelson, R. R. Rowland, D. A. Benfield: Evaluation of intranasal vaccination for PRRSV and the mucosal immune response in the boar. National Pork Producers Council Grant, 1995.
52. Nelson, E. A., D. A. Benfield, **J. Christopher-Hennings**, Christopher C. L. Chase: Development and evaluation of a blocking and/or competitive ELISA for the improved serodiagnosis of Porcine Reproductive and Respiratory Syndrome. National Pork Producers Council Research Proposal. July 1, 1995-June 30, 1996.
53. Benfield, D. A., **J. Christopher-Hennings**, E. A. Nelson: Use of a commercial Porcine Reproductive and Respiratory Syndrome virus vaccine (RespPRRS) to control PRRSV infection in boars. South Dakota Pork Producers Council Research Proposal. July 1, 1995-June 30, 1996.
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