

1) Refereed publications [50000 w spaces = limit]

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Allerson M, Deen J, Detmer S, Gramer M, Joo HS, Romagosa A, Torremorell M. (2012) The impact of maternally derived immunity on influenza A virus transmission in neonatal pig populations. *Vaccine.* In press

Alonso C, Otake S, Davies P, Dee S. An evaluation of interventions for reducing the risk of PRRSV introduction to filtered farms via retrograde air movement through idle fans. *Vet. Microbiol.* (2012), 157, 3-4, 304-10.

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Araujo KPC, Souza CJH, Samuel M. Abrams SM, Zimmerman J, Kittawornrat A, Fang Y, Rowland RRR, Joan K. Lunney JK. 2012. Cytokine detection in Oral Fluids from pigs vaccinated or infected with PRRSV using Multiplex Fluorescent Microsphere Immunoassays. *Vet. Immunol. Immunopathol.* Submitted

Arceo M, Ernst CW, Lunney JK, Choi I, Raney NE, Huang T, Tuggle CK, Rowland RRR, Steibel JP. 2012. Characterizing differential individual response to Porcine Reproductive and Respiratory Syndrome Virus infection through statistical and functional analysis of gene expression. *Frontiers in Livestock Genomics.* In Revision.

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Boddicker N, Rowland R, Lunney JK, Garrick DJ, Reecy J, Dekkers JCM. 2012. A major QTL associated with host response to Porcine Reproductive and Respiratory Syndrome virus challenge. *J. Anim. Sci.* 90: 1733 - 46.

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Bottoms K, Poljak Z, Dewey C, Deardon R, Holtkamp DJ, Friendship R. 2012. Evaluation of external biosecurity practices on southern Ontario sow farms. *Prev Vet Med* (In press)

Brockmeier, S. L., C. L. Loving, A. C. Vorwald, M. E. Kehrli, Jr., R. B. Baker, T. L. Nicholson, K. M. Lager, L. C. Miller, and K. S. Faaberg. 2012. Genomic sequence and virulence comparison of four Type 2 porcine reproductive and respiratory syndrome virus strains. *Virus Res.* 169:212-221.

Brockmeier, S. L., C. L. Loving, E. A. Nelson, L. C. Miller, T. L. Nicholson, K. B. Register, M. J. Grubman, D. E. Brough, and M. E. Kehrli, Jr. 2012. The presence of alpha interferon at the time of infection alters the innate and adaptive immune responses to porcine reproductive and respiratory syndrome virus. *Clinical and vaccine immunology : CVI.* 19:508-514.

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E. FUNDING SOURCES FOR RESEARCH:

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USDA NIFA. Patience et al., 2010-2015. Improving biological nutrient use and thus feed efficiency in the U.S. pork industry through innovative scientific and extension approaches for a more sustainable production. \$65,000

USDA NRI 2009-35204-05290 Rowland and Hesse, 2009-2012., Mapping host protective immunity in the PCV2 capsid protein, \$240,000.

USDA NRI Coordinated Agricultural Program (CAP), Rowland et al., 2008-2012. Integrated strategies to control and reduce the impact of PRRS virus control, \$4.9 million.

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USDA –NRICGP CAP2 (Via Kansas State University Sub-contract) Immunologic Consequences of PRRSV Diversity UNL (Osorio FA) 07/1/2012- 06/30/2013,\$121,690

USDA-AFRI Ying Fang and Renukaradhya J. Gourapura. Innovative strategies to enhance PRRSV specific innate and mucosal immunity: implication for development of broadly protective PRRSV vaccine., February 2012 – February 2017

USDA-AFRI-NIFA 2011-02917 (Animal Health and Production and Animal Products: Animal Health and Disease) Porcine Reproductive and Respiratory Syndrome Virus: Modulation of Innate and Acquired Immune Response \$484,000 Dec 2011- Dec 2014 (Pattnaik AK & Osorio FA)

USDA-NIFA (Multi-institutional collaboration and USDA)

USDA-NIFA 2011-67012-30719Kenney SP, and Meng XJ. . PRRSV protein signaling in PRRS pathogenesis. 2011 – 2013.

USDA-NIFA-2010-03437. Meng XJ, Huang Y, and Opriessnig T Engineering PRRSV Vaccines that confer heterologous protection. 2010- 2014.

USDA-NIFA-2011-02801 Elankumaran S, and Meng XJ. . A multicomponent virus vectored vaccine for PRRSV and other swine pathogens. 2012 – 2016.

F. WORK PLANNED FOR NEXT YEAR

Objective 1. Elucidate the mechanisms of host-pathogen(s) interactions.

Immunity and pathogenesis (PRRSV):

- 1) To continue investigations of PRRSV evolution, structure and immunity(UMN)
- 2) To continue investigations on anti-IFN effect of PRRSV UMD, UNL,SDSU,UIUC)
- 3) PRRSV non-structural proteins and their interactions with host-cell proteins(UCONN)
- 4) Type I IFN response in swine (UCONN)
- 5) Nsp2 mutants carrying immune-stimulators to enhance PRRSV-specific immune response, implications for vaccine (SDSU).
- 6) Pursuit of broadly neutralizing antibodies X PRRSV (UNL)
- 7) Pursuit of conserved T cell epitopes and their application to multi-epitope vaccines (UNL,UIUC)
- 8) In vivo analysis of engineered PRRSV(NADC)
- 9) Assessment of host response to different strains of PRRSV(NADC)
- 10) Continue to make progress on the characteristics of PRRSV immunity, including the role of genetics.(KSU)
- 11) Continue to study the role of macrophages and dendritic cells in PRRSV immunity.(KSU)
- 12) Develop a SCID model for investigating PRRSV immunity and pathogenesis.(KSU)
- 13) As part of to the Veterinary Immune Reagents Network (US VIRN) BARC will continue to develop immune reagents for the research community(USDA BARC)

14) Conferring homologous and heterologous protection X PRRSV by rTGEVs vectors (CNB-CSIC)

Virus structure (PRRSV):

1. Structural studies of PRRSV nonstructural protein 2 (NADC)

Other emerging viral diseases:

1. To continue investigations of mechanisms of PCV2 pathogenesis(UMN)
2. To collaborate with USDA APHIS on the NAHMS swine health survey to assess PCV2 status(UMN)
3. To continue with Influenza studies (UGA) some of them in co-infection with PRRSV(UGA)

Objective 2. Understand the ecology and epidemiology of PRRSV and emerging viral diseases of swine.

PRRSV

- 1) To assess the sustainability and cost-benefit of filtration as a means to reduce the risk of airborne viral spread between farms. (UMN)
- 2) To further investigate the role of PRRSV-contaminated slurry as a means of viral spread between farms.(UMN)

Other emerging viral diseases:

1. To continue investigations of influenza transmission dynamics.(UMN)
2. Surveillance in selected farms in South Dakota will be conducted comparing SIV sequences between people, swine and turkeys(SDSU)

Objective 3. Develop effective and efficient approaches for detection, prevention and control of PRRSV and emerging viral diseases of swine.

Detection:

1. Continued evaluation of on-site field testing for PRRSV will be conducted(SDSU)
2. Develop and test new PRRSV diagnostic microarray(USDA NADC)
3. New assays (cytokine FMIA, microarray and RNAseq analyses) will be used to produce more data on PHGC pig samples (USDA BARC)

Prevention (PRRSV):

1. We will continue to work on PRRSV host interaction and PRRSV vaccine development(SDSU)
2. Pursuit of an optimal DIVA Marker system for PRRSV MLVs (UNL, SDSU)
3. PRRSV diversity applied to characterization of heterologous protection (UWM, UIUC, UNL, SDSU)
4. Optimization of immunization X PRRSV infection by exploring nanoparticle-based platforms and potent mucosal adjuvants (Ohio)

Control (PRRSV):

UMN, and ISU

Other emerging viral diseases:

1. Continued development of FMIA for SIV vaccine evaluations (SDSU)