**APPENDIX D**
**SAES-422
Format for Multistate Research Activity
Accomplishments Report**

**Project/Activity Number: NC-229. Title:** **PRRSV and other emerging viral diseases of swine**

**Period Covered: November 30 2016 to December 1, 2017**

**Date for This Report to be submitted to NIMSS: March 2, 2018**

**Annual Meeting Date: December 3, 2017**

**Participants:**

The following stations were represented at the meeting:

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**Table 1:**

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| NC229 2017 Annual Meeting: “***New Science: Insights for Control of Swine Viral Diseases”*****Sunday December 3 2017, 1-5 PM** **Denver-Houston Room ,Marriot Downtown Hotel, Chicago Illinois** |
| **1:00-1:05** David Benfield, OSU, administrative advisor NC229 “Welcome”  | **3:00-3:20** Kelly Lager NADC USDA/ARS “Update on Senecavirus pathogenesis” |
| **1: 05-1:25** “Differential rates of PRRSV replication in antigen presenting cells: potential implication on adaptive immunity”Joe Darbellay and Volker Gerdts Univ Saskatchewan, Canada | **3:20-3:40** Andres Perez UMN“Weaned pigs source of genetic diversity of swine influenza virus , implications for SIV vaccination |
| **1:25-1:45** Hiep Vu, Univ Nebraska“Following a strategy to broaden the protective capacity for PRRSV MLV vaccines” | **3:40-4:00** Wenju Ma KSU“SIV: The pig a mixing vessel, in vitro and in vivo” |
| **1:45-2:05** Federico Zuckerman Univ Illinois UC “Unfolded protein response to PRRSV : enhancement and suppression , contrasting effects on cytokine production” | **4:00-4:20** Heather Wilson VIDO-Intervac Saskatoon , Canada “Uterine mucosal immunization in pigs: Porcine parvovirus model” |
| **2:05-2:25** Crystal Loving NADC USDA/ARS “Metabolism, homeostasis and PRRSV acquired immune response” | **4:20-4:40** Peter Johnson/Margo Holland USDA NIFA “Update from NIFA” |
| **2:25-2:45** Aradhya Gourapura OSU Advances on intranasal mucosal immunization of swine.  | **4:40-5:00** NC-229 business meeting, renewal of authorities for executive technical committee  |
| **2:45-3:00** Break  | **5:00** Adjourn  |

**Brief summary of minutes of annual meeting**:

The 2017 NC229 meeting was held on the afternoon of December 3, 2017, at the Marriot Downtown Hotel in Chicago Illinois. Meeting attendance exceeded 80 persons and participating stations represented are listed above. The meeting Agenda is shown in Table 1 (see above). The business meeting centered on the topics noted below:

1. **Dr S. Ramamoorthy** (NDSU) was nominated and unanimously elected as the incoming
NC-229 Vice–Chair.
2. There was strong group support for submitting an NC229 renewal proposal in 2018. Efforts in early 2018 will include discussion among members on proposal focus and emphasis and on assembling a representative writing team for proposal preparation.
3. Planning and scheduling of future NC-229 annual meetings was briefly discussed. It was suggested that closer alignment of the meeting with CRWAD, perhaps involving dedicated NC-229 sessions within the CRWAD program might be advantageous for maintaining NC-229 identity and avoiding excessive overlap with the NA PRRSV symposium and other weekend events. The need for a formal registration fee to cover costs of the meeting was also raised. A survey soliciting opinions on the future of NC-229 meeting structure will be circulated to participating stations in early 2018.
4. Meeting adjourned 5:30 PM

**Accomplishments by objective :**

**Objective 1. Control of PRRSV**

In objective 1, the major areas of focus/achievements by the NC-229 group during 2017 included:

**1.1 Innate immunity against PRRSV**. Studies were conducted on the effect of PRRSV NSPs on innate immunity mechanisms, on apoptosis, and the capacity for PRRSV viruses to modulate overall immune response by stimulating IFN rather than suppressing it. Also included were the effect of PRRSV of macrophages and cytokines modulation. The stations with studies in this area were: UCONN, UIUC, KSU, OSU, China Agr U, NE, NADC, SDSU and UMD

**1.2 PRRSV immunity and vaccinology**. Work to understand correlates of immunity and mechanisms to broaden protection, including neutralizing antibodies, developing of naturally occurring or synthetic strains of PRRSV inducing broader protection, alternative vectors for delivering PRRSV antigens or epitopes, DIVA marker systems, mechanism of attenuation and immunogenic potential of NSPs etc. was conducted. The stations with studies in this area were: UMN, UMD, VPI, NADC, UNL, UIUC, UWI, ISU, NE and KSU

**1.3 Virulence of PRRSV**. Studies aimed at understanding virulence factors/markers and impact of bacterial co-infection on disease severity were performed by stations: NADC and China Agr U

**1.4 Mapping genetic of resistance** to PRRSV infection (ISU and KSU) , genetic modification of receptors (KSU) were conducted.

**1.5 Epidemiology of PRRSV** transmission, which may include aerobiology, and virus evolution was conducted by: UMN, ISU, VNIIVViM-Russia and UWI, Detection of PRRSV in studs (ISU)

**1.6 Economic Impact** of PRRSV control; UMN, ISU

**1.7 Outbreaks investigations** for breeding herds and oral fluids monitoring (ISU)

**Objective 2 Developing effective and efficient approaches for detection, prevention and control of emerging viral diseases of swine.**

In objective 2, the major areas of focus/achievements by the NC-229 group during 2017 included:

**2.1** ascertaining pathogenesis and transmission of and establishing diagnostics and reagents for **PEDV**:(ISU, UMN, OSU, KSU, SDSU, VNIIVViM-Russia, Purdue) Studying the protective immune response to PEDV: OSU

**2.2** Genomics and replication of **PCV and novel ss DNA viruses** of swine (ISU, NDSU, NADC)

**2.3 Genetic and antigenic evolution of swine influenza virus** (SIV) and epidemiology of transmission of SIV (NADC UMN, ISU, SDSU, CENSA-Cuba) testing of SIV vaccines in vivo (NADC) and in vitro models (Purdue) testing of adjuvants for SIV inactivated immunogens (NADC)

**2.4** Characterizing the ongoing outbreak of **Seneca valley virus** (SVV), development of diagnostic tools and characterization of pathogenesis, fulfillment of Koch’s postulates: ISU, SDSU, UMN, KSU

**2.5** Characterization of diagnostic reagents for **Atypical Pestivirus of Swine** (KSU, ISU).

**2.6 Classical swine fever** pathogenesis & epidemiology (UCON) and vaccinology (CENSA-Cuba)

**2.7 African Swine Fever Virus**, epidemiology (VNIIVViM-Russia, UIUC) and protective immunity/vaccinology (VNIIVViM-Russia, UIUC, KSU, TexA& M)

**2.8 Swine vesicular disease virus** (VNIIVViM-Russia)

**2.9 New vaccines for swine parainfluenza type 1** (ISU)

**2.10 Rapid response vaccinology for emerging diseases of swine (NDSU, ISU)**

**A complete description of all research work conducted by participating stations (submitting reports in 2017) is attached.**

**Impacts:**

General impacts of the NC-229 program in 2017

* The NC-229 annual meeting continues to positively impact researchers in the area of swine viral disease. The meeting is widely attended by active and engaged research scientists. This year, the high quality scientific presentations under the general theme: “***New Science: Insights for Control of Swine Viral Diseases”*** resulted in discussions of considerable value for the research community as a whole.
* Outputs of peer-reviewed publications in 2017 were notable; the NC-229 group has published a total of 178 refereed journal publications this year (see “2017 NC229 Publications”).

Some selected examples of NC-229 research impacting viral diseases of swine in 2017 follow:

**Impacts for PRRSV Control:**

* Possible role of IFN-positive PRRSV strain on vaccine improvement (UMD)
* Advances in understanding virulence of highly pathogenic PRRSV (CHINA Agr U)
* Focus on broadly neutralizing antibodies and swine genetics may provide a bio-marker for broadly protective vaccine (KSU)
* Initial experiments in North America to approach intertypic cross protection using MLVs (OSU and KSU). License of a new concept MLV to a company (NE)
* Extensive analysis of the role of recombination and genomics of PRRSV and its effect on virulence (NADC, China Agr U)

 **Impacts for PEDV and other endemic swine viruses research**
* Development of diagnostic immunoreagents and techniques for senecavirus serology (SDSU and ISU)
* PEDV pathogenesis, and SVV pathogenesis and diagnostic tools (ISU, MN, SDSU, KSU)
* Methods for the development of rapid-response serological diagnostics were developed for PEDV (NDSU) PEDV, and
* Evidence that composting represents an effective and bio-secure approach to inactivate PEDV in porcine carcasses (NEB)
* Risk assessment of feed transmission for PEDV (SDSU, NEB)
* Swine health monitoring program for monitoring swine influenza (SIV) transmission (MN) and molecular classification and public health implications (NADC and UGA)
* Evaluation of viral strains and platforms to improve current vaccines (NADC, ISU, MN, SDSU).

**Publications/funding sources:** (see attached “2017 NC229 Publications”).

**Authorization**: Submission by an AES or CES director or administrative advisor through NIMSS constitutes signature authority for this information.

\*Limited to three pages or less exclusive of publications, details may be appended.