

**NATIONAL PORK BOARD**  
**Spring Request for Proposals - 2009**

***DEADLINE: Tuesday, April 28<sup>th</sup>, 2009 – 5:00 p.m. CST***

The National Pork Board is soliciting research proposals dealing with:

**B – Swine Health**

**H – Environment/Public Health**

**L – Antimicrobial Use/Resistance**

Please read carefully the individual solicitation descriptions for project proposals. If you have questions related directly to the description of a specific solicitation, contact the staff member listed in charge of the program area. For questions on the submission process, contact Bev Everitt at [beveritt@pork.org](mailto:beveritt@pork.org) or 515/223-2750.

**STAFF MEMBERS:**

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<b>Environment/Public Health and Antimicrobial Use/Resistance</b>	<b>Liz Wagstrom</b>	<b><a href="mailto:lwagstrom@pork.org">lwagstrom@pork.org</a></b>	<b>515/223-2633</b>

To be considered for committee review, **all proposals must be submitted via the website by 5:00 p.m. CST on Tuesday, April 28, 2009** (see [www.pork.org](http://www.pork.org) for links). Proposals will be reviewed by both technical advisors and pork producers prior to the committee selection meetings. Final funding is subject to approval by the National Pork Board and USDA.

**NOTES:**

Proposal selection will occur in mid-June 2009.  
Notification of grant awards will be done in late-July 2009.  
Project funding will begin September 1<sup>st</sup>, 2009.  
Requests for second-year funding must be resubmitted.

## **B. SWINE HEALTH-PCVAD**

### **Introduction**

Porcine Circovirus has been identified in U.S. swine herds since the 1990's and can be found in most swine herds, with or without causing disease. However, more severe disease was diagnosed in North America since 2005. In April 2006, the Porcine Circovirus Associated Disease (PCVAD) strategic Planning Workshop was held to develop research priorities for PCVAD. Research priorities have included: identifying the virus responsible for disease, diagnostics, control measures, and biosecurity efforts, studying the distribution of the virus, disease prevention and control, treatment practices and impact of PCVAD and co-infections

With the advent of available vaccine interventions for growing pigs, the control of PCVAD has improved. However, there are many unanswered questions regarding the immunological impact of vaccine and subsequent expression of disease on various ages of swine. Additional critical areas of research focus have been identified through discussions with scientific researchers, veterinarians, producers and allied industry representatives, and have helped create the 2009 research priorities.

### **Research Priority**

*The National Pork Board is calling for research proposals addressing five priority areas including Immunology, Epidemiology, Pathogenesis, Diagnostics, and Prevention and Treatment. The research priorities to be addressed in this call for proposals are outlined below. Full and transparent justification for budgets with proposals is expected. No exact funding limit for each of the following areas has been established.*

#### 1) Immunology

- a. Investigate the effect of strain variation on cross-protection and on cell mediated immunity and humoral immunity.
- b. Determine cross protection and whether immunogenic epitopes need to be conserved among different strains.
- c. Is there a negative immune reaction to vaccination of piglets at weaning resulting in an excess of sub-optimally performing pigs within the first three weeks post-weaning?
- d. What are the effects of maternal vaccination and transfer of antibodies to offspring on the efficacy of vaccination of offspring – including duration of passive immunity and its effect of active vaccine response?
- e. What is the duration of immunity in vaccinated piglets that have co-infection with PRRS? What is the duration of immunity in weaned pigs intended for replacement animals (boars and gilts)?
- f. What is the effect of vaccination on viremic pigs?
- g. What is the immune status of pigs that remain serologically negative for the virus compared to littermates/pen mates that seroconvert?
- h. Determine the effect of vaccination upon the immune status of gilts intended for breed stock replacements
  - i. Are vaccinated gilts that are serologically negative for PCV2 still protected from disease?

#### 2) Epidemiology

- a. Investigate and identify factors influencing transmission: virus type, pig genetics, herd size, and production system (number of sites).
- b. Molecular epidemiology—establish a PCV2 sequence database that links strain sequence with clinical disease, infectious co-factors, management practices, chronology and geographic locale.
  - i. Investigate how much genetic variation there is within a genotype
  - ii. Determine if that genetic variation is also reflected as antigenic variation
- c. Develop checklists of risk factors, management approaches, and roles of other agents, cofactors, and serum therapy.
- d. Evaluate current practices in relation to disease transmission
- e. Estimate whether susceptibility, transmissibility and persistence change with age, PCV2 strain, various co-factors and management factors.
- f. Define the duration of PCV2A and PCV2B infection and the ability to be transmitted when:

- i. Young pigs are infected.
  - ii. When older pigs are infected.
- g. Molecular epidemiology—establish a PCV2 sequence database that links strain sequence with clinical disease, infectious co-factors, management practices, chronology and geographic locale.
  - i. Investigate how much genetic variation there is within a genotype – determine if genetic variation is also reflected as antigenic variation
- h. Evaluate current biosecurity practices that may prevent infecting a herd
  - i. What is the effect of farm entry procedures on transmission of PCV2 within a herd?
- i. What is the minimal infective dose of PCV2, in cooked and uncooked fresh or frozen meat or meat products that can cause viremia and seroconversion in naive pigs after consumption?

### 3) Pathogenesis

- a. Develop tools for pathogenesis research, including source of PCV1-and PCV2-negative pigs (all ages), reproducible disease model, and technology to look for other agents.
- b. Determine variability in disease expression due to host variation, i.e., genotype-phenotype, age-parity, management, and gender.
  - i. Is there a reduction of overall viral load in populations that have been vaccinated?
  - ii. Is there a change in the protective status of vaccinated animals to subsequent exposure to PCV2?
- c. Determine the role of PCV2 in vertical transmission:
  - i. The frequency of vertical transmission
  - ii. If it is constant or changing as a function of the PCV2 genotype and antibody status of the breeding herd
  - iii. Effect of sow/gilt exposure to PCV2
- d. Characterize diseases caused by PCV2 and selected co-factors:
  - i. Does co-infection with specific co-factors result in a specific disease syndrome—PCVAD model systems to investigate include: PDNS, Shaker Pigs, PRDC, PMWS—agents to investigate include: PCV2A & 2B, PRRS, Torque tenovirus, Parvovirus, others.
- e. Determine the role of PCV2 in vertical transmission:
  - i. What is the economic effect on sow/gilt reproductive performance from exposure to PCV2
  - ii. What is the effect of vaccination on weaned boars and subsequent duration of immunity?
  - iii. What is the effect of vaccination on weaned boars and subsequent shedding of PCV2 in semen?

### 4) Diagnostics

- a. Develop standardized diagnostic tools for use the diagnostic laboratories in North America. Tools and Tests include:
  - i. Tissue Culture adapted PCV2a, and PCV2b,
  - ii. Monospecific polyclonal and monoclonal antibody,
  - iii. Standardized IFA and serum neutralization serology,
- b. Develop protocols for monitoring boar studs and breeding herd, especially for the purpose of producer surveillance and import criteria.
- c. Develop protocols for monitoring vaccine compliance and evidence of seroconversion
  - i. DIVA technology for natural vs. vaccine exposure

### 5) Prevention and Treatment

- a. Investigate the relationship of maternal/passive antibody and:
  - i. Vaccination interference—Determine if high levels of maternal antibody interfere with vaccination
  - ii. Investigate how much antibody variation exists in the breeding herd and how this might impact maternal antibody transfer
    - 1. Determine if that variation is a function of parity
    - 2. Determine if it would be beneficial to have the same level of antibody in the breeding herd

- iii. Cross serotype/genotype infection—Investigate if maternal antibody have the same “protective” effect on PCV2A and PCV2B (i. e. does one virus get in and infect baby pigs sooner than the other one in pigs that have the same levels of passive antibody)
- iv. Determine if passive antibody against one genotype promotes infection at a younger age with the other genotype
- b. Determine vaccine efficacy in the face of PCV2 and cofactors.
- c. Investigate ability to produce PCV2 negative pigs from positive herds. If possible, determine ramification of repopulating with PCV2 negative pigs.
- d. Investigate what is the optimum timing for vaccination
- e. Investigate the ability to roll a herd negative for PCV2.

## **H. PUBLIC HEALTH**

*Multi-disciplinary proposals are encouraged. Funding limit is \$50,000 per project. A larger funding request may be considered if appropriate justification is given, especially for farm level trials with numerous replicates. Researchers are encouraged to find matching funds or work on collaborative projects. Novel approaches and concepts are encouraged even if they do not fit into a specific priority area. Methicillin resistant Staph aureus (MRSA) research is the top priority for the industry. Specific topics of interest with regard to MRSA and other zoonotic pathogens are described below (please note that these are **not** in priority order):*

1. Studies to identify risk factors associated with MRSA presence on farm.
2. Studies to define the relationship between MRSA carriage in live animals and prevalence of MRSA in pork products.
3. Studies to determine the impact of post harvest interventions on MRSA in pork products, including determination of cooking temperature that achieves lethality for MRSA in various pork products.
4. Studies to develop feasible interventions for MRSA on farm.
5. Studies to examine spread of MRSA within and between farms, and in the environment.
6. Studies to determine prevalence, diagnose, describe the epidemiology and/or assess the human health risk for emerging and re-emerging zoonotic diseases including but not limited to; Norovirus, Clostridium difficile, Toxoplasma gondii, Hepatitis E, Influenza A and others that may be associated with pigs.
7. Studies to evaluate intervention methods in pork production, including animal vaccination strategies, to protect humans from zoonotic diseases that may be present in pork production facilities.
8. Studies to assess the occupational and/or public health impact of pork production facilities.

## **L. ANTIMICROBIAL USE AND RESISTANCE**

*Funding limit is \$50,000 per project. A larger funding request may be considered if appropriate justification is given. Researchers are encouraged to find matching funds or work on collaborative projects. Novel approaches and concepts will be considered even if they do not fit into a specific priority area. Research priorities include:*

1. Studies to characterize movement of antimicrobials, antimicrobial resistant bacteria, and or antimicrobial resistance genes from swine farms and assess potential risks and risk factors of such movement
2. Studies of the occurrence and movement of specific genetic elements important for the development of multi-drug resistance, including an assessment of the relationship between antimicrobial use and the occurrence of these specific genetic elements.
3. Studies to determine the depletion of antimicrobials commonly used in pork production without a Codex maximum residue level (MRL) or with Codex and/or export partner MRLs that are lower than the US MRL. Matching funding from the drug's sponsor is desirable.