NATIONAL PORK BOARD
Request for Proposals
General Call - 2008

DEADLINE: Tuesday, November 27th, 2007 – 5:00 p.m. CST

The National Pork Board is soliciting research proposals dealing with:

A – Environment

B – Swine Health
C - Animal Welfare
D – Pork Safety – Pre-Harvest
E – Pork Safety – Post Harvest
G – Human Nutrition
H – Public Health
L – Antimicrobial Use & Resistance
M – Genomics
N – Nutritional Efficiency
S – Sow Lifetime Productivity
W – Worker Safety

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 or 515/223-2750.

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To be considered for committee review, **all proposals must be submitted via the website by 5:00 p.m. CST on Tuesday, November 27th, 2007 (see 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 February 2008.
Notification of grant awards will be done in mid-March 2008.
Project funding will begin May 1st, 2008.
Requests for second-year funding must be resubmitted.

A. ENVIRONMENT

The Environment Committee is soliciting proposals in the following targeted areas only. Projects are funded on a one-year basis. Consideration for funding subsequent years of multi-year efforts may be considered based on demonstrated accomplishments of previously funded research efforts toward success of the overall research project as described in interim or final research reports, and submittal of a new proposal covering the new funding requested. Funding for each project will generally be limited to not exceed $40,000 unless documentation of need and compelling justification for a greater amount is provided.

1. Quantify background concentrations of potential air contaminants in rural agricultural environments and differentiate between background levels and contributions from pork production operations. Contaminants to be studied are to include ammonia, hydrogen sulfide, methane and particulate matter. Particulate matter will look at particle sizes less than 2.5 microns, 2.5 to 10 microns and greater than 10 microns.
2. Quantify contributions and effects on outdoor air quality external to neighboring residences, schools, recreation areas and other public use areas from emissions of methane, ammonia, hydrogen sulfide and particulate matter due from pork production operations. Studies are to include contributions and effects from operations using different manure storage technology including lagoon/earthen basin, below building deep pit and above ground formed storage systems.
3. Quantify the relative contribution and water quality impacts of nutrients, hormones and common antibiotics used in swine operations to surface and groundwater water due to land application of swine manure to crop ground. The study will be based on land application of manure at agronomic rates appropriate to the crops to be grown and in consideration of the soil types and evaluate contribution and effects from both surface applied and injection land application methods.
4. Identify currently available and technologically feasible on-farm water conservation management practices and quantify their effectiveness in terms of reduction in overall water consumption on an operation. The study will also identify the economic cost for installation, operation and maintenance and the economic benefits of the conservation practices. This study will address both finishing operations and sow farm operations.
5. Quantify the technical and economic effectiveness of bio-filters in reducing emissions of methane, ammonia, and hydrogen sulfide as well as particulate matter from swine barns. Quantification of particulate matter reduction will differentiate between particles smaller than 2.5 microns, 2.5 to 10 microns and larder than 10 micron in size.

B. SWINE HEALTH

*The Swine Health Committee is soliciting proposals on issues and conditions affecting the health of swine. Funding is **$50,000** per project. A larger funding request may be considered if appropriate justification is provided. Projects that link swine practitioners and research laboratories in field studies are especially encouraged. Research initiatives for each of the following complexes, syndromes, or pathogens should address the epidemiology of the individual agents and their interactions with other pathogens and/or proposed control or practical eradication strategies.*

1. Porcine Respiratory Disease Complex

PRRS – PRRS-specific projects will not be considered for this RFP.

Mycoplasma -Specific priorities for mycoplasma research include the following:

- Elimination
- Diagnostics
  - Development of a quantitative diagnostic assay
  - Improvement of the currently available diagnostic reagents
  - Development of a test to measure antibody response
- Strain variability and the effect on virulence and pathogenicity
- Control
  - Management factors of the sow herd
  - Impact of passive transfer
  - Quantify vaccine effect on colonization

Influenza -Specific priorities for influenza research include the following:

- Determine role and mechanisms in PRDC
- Stability issues / New strains / What drives drift and mutations (Can vaccine be a driver?)
- Variation in pathogenicity in different isolates / Effect of herd immunity on virulence variance / What causes the varying virulence of strains in different herds?
- Role in reproductive disease? (especially the newer strains)
- Development of practitioner based diagnostics (+/- diagnostics)
- Vaccination and levels of antigenic difference
- Discovery of the shedding period in the field (Do carrier animals occur?)
- Discovery of reservoirs of the virus (rodents, wild fowl, etc.)

Pasteurella and other Bacteria

- Quantitative epidemiology of PRDC mixed infections
- Role of secondary bacterial components in PRDC

2. Breeding Herd Syndromes

Reproductive

- Influenza
- Erysipelas

3. Biosecurity

Research initiatives for biosecurity issues should relate each with the risk of domestic or foreign animal disease transmission into and/or within the herd. Interest in this area is focused on the development of scientifically sound biosecurity protocols through practical field demonstrations.

Transmission of Domestic or Foreign Animal Diseases

- Animals/Genetic Material
- Fomites, including transmissibility through fresh or processed meat products
- Pig-free or Downtime Issues
- Feral swine

Cleaning and Disinfection

- Facilities/Equipment
- Transport Vehicles, Personnel, and Equipment

4. Foreign Animal Diseases

Diagnostic tests

5. *Epidemiology*

Domestic disease surveillance

Growing pig mortality

6. Segregated Early Weaning Disease Issues

Strep. suis

Actinobacillus suis

Haemophilus parasuis

7. Emerging Diseases and Syndromes

Porcine Circovirus-associated Diseases- PCVAD-specific projects will not be considered for this RFP.-

Hepatitis E Virus

8. Enteric Disease Syndromes

Post-weaning Diarrhea

- ? Post-weaning *E. coli*

Grow/Finish Diarrhea

- ? Salmonella
- ? Gastric Ulcers
- ? Lawsonia (Ileitis)
- ? Brachyspira (Colitis)
- ? Hemorrhagic Bowel Syndrome

C. ANIMAL WELFARE

The Animal Welfare Committee is requesting proposals on issues affecting the welfare of swine, particularly handling and transportation and general production practices. Research topics are listed below in priority order. Researchers are encouraged to find matching funds and projects that are multidisciplinary in their approach are encouraged. Principal investigators will need to describe research methodologies in detail. Behavioral methods and physiological assays used in the studies need to be validated. The budget request of the proposal should be appropriate for the work that is proposed.

1. **On-Farm Euthanasia** – It is inevitable that in every swine production system animals will become ill or injured in such a way that euthanasia will be necessary. Specific research topics of interest with regard to euthanasia are described below (please note that these are **not** in priority order):
   a. Develop a euthanasia "decision tree" to help producers make decisions about timely euthanasia
   b. Determine the necessary characteristics - such as length, velocity, diameter, etc. - of a penetrating captive bolt to ensure death for different ages of pigs
   c. Develop and evaluate new effective methods of euthanasia for each age of pig.
   d. Characterize the ballistics of firearms needed for safe and humane euthanasia.
2. **Gestation Sow Housing –** Housing of gestating sows has been and continues to be an important question for the swine industry. Specific research topics of interest with regard to housing and management of gestational sows are described below (please note that these are **not** in priority order):
   a. Determine the minimum/optimum time period needed to maintain sows individually post-breeding that best provides for the well-being of the sow and the protection of the developing embryos.
   b. Determine ideal criteria for creating groups of sows – such as grouping by age, size, degree of relatedness, BCS, etc. - to optimize individual well-being, lifetime productivity and reproductive performance/efficiency.

c. Develop and evaluate new and innovative housing and management systems for gestating sows not commonly in use in the U.S., that optimize individual well-being, management/labor, lifetime productivity and reproductive performance/efficiency.
d. Evaluate the impact that various components of the sow's physical environment – such as flooring, bedding, air quality, pen shape, resource location, etc. - has on maternal performance/efficiency, lifetime productivity and overall well-being.

3. **Handling and Transportation** – The handling and transport of pigs is a critical element to the swine industry. Many different ages of swine are transported and it is important to understand the needs of the pigs at each stage of life in order to transport them to their destination safely while minimizing stress as much as possible. Specific research topics of interest with regard to handling and transportation are described below (please note that these are **not** in priority order):
   a. Develop and evaluate technologies and/or techniques that contribute to a low stress handling system that promotes self movement by the pigs.
   b. Develop and evaluate alternative trailer designs/modifications that contribute to the pig's well-being during transport.
   c. Determine the needs of weaned pigs or feeder pigs during transport in regards to length of transport, ramp design, ventilation, etc.
   d. Determine the needs of adult sows and boars during transport in regards to loading density, length of transport, ramp design, ventilation, etc.
4. **Production Practices –** It is important to understand the factors within pork production, whether human interaction or physical environment, that could have a potential impact on the well-being of the pig. Specific research topics of interest with regard to production practices are described below (please note that these are **not** in priority order):
   a. Evaluate the necessity of common production practices (e.g., litter processing procedures) on animal production. If procedure is deemed necessary then develop and evaluate potential alternatives or modifications based on the well-being of the pig.
   b. Determine the short- and long-term impacts weaning age has on piglet health and behavior.
   c. Evaluate the impact that various components of the pig's physical environment –such as flooring, bedding, air quality, pen shape, resource location, etc. - has on production and overall well-being.

D. PORK SAFETY - PreHarvest

*Pre-harvest food safety research for the following agents or pathogens should include the areas of epidemiology, pathogenesis, prevalence, on-farm risk factor management, monitoring and measurement, and/or intervention or control strategies. 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. Salmonella research is the top priority for the industry. Specific topics of interest with regard to Salmonella and other pathogens are described below (please note that these are **not** in priority order):*

1. Development and evaluation of methods for enumerating Salmonella before and after interventions to find out their effectiveness.

2. Risk assessment model development to quantify the relationship between on-farm prevalence of Salmonella and other zoonotic pathogens to the risk of human illness.
3. Development and evaluation of evolving molecular, and other, diagnostic tools and monitoring techniques for food safety pathogens that can be used in epidemiological investigations.
4. Test the impact of Salmonella lairage reduction programs on the amount of Salmonella found on the carcass or in the final product.
5. Evaluation of dietary characteristics (feed form, dietary ingredients, antibiotic use, feed contamination levels, etc.) as a potential intervention strategy to reduce Salmonella prevalence.
6. Study transmission rate of Salmonella within production systems, or barns, and by serotype or genotype.
7. Toxoplasma, Campylobacter and Yersinia – specific topics of interest with regard to these pathogens are described below (please note that these are **not** in priority order):
    a. Development of management and/or facility strategies for outdoor or bedded pigs to reduce the risk of these pathogens.
    b. Identification of previously unrecognized risk factors for infection with these pathogens, and interventions to address those risks.
    c. Controlled studies to determine the relative contribution of water sources on these pathogen infections in swine and effective interventions at the producer level.

E. PORK SAFETY - Post-Harvest

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.

1. Salmonella research is the top priority for the industry. Specific topics of interest with regard to Salmonella are described below (please note that these are **not** in priority order):
    a. Development and evaluation of methods for enumerating pathogens before and after interventions to find out their effectiveness.
    b. Studies to increase the knowledge base of multi drug resistant (MDR) bacteria in pork and to determine their susceptibility to interventions.
    c. Expand knowledge of stress adaptation and cross protection of pathogens.
    d. Identification of sanitation procedures capable of preventing cross contamination with allergens.
2. Impact of production practices on carcass defects and physical hazards. Research should include the areas of epidemiology, pathogenesis, prevalence, risk factor management, monitoring and measurement, and/or intervention or control strategies.
    a. Studies to determine the impact of alternate injection methods and/or techniques (such as hip injection or needle free injection systems) on carcass defects and/or physical hazards. Long term studies in sows and market hogs are desirable.
    b. Studies to determine the causes of, and farm-level interventions for, carcass defects such as abscesses and/or physical hazards

G. HUMAN NUTRITION

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: No exact funding limit has been established.

1. Studies to analyze carcinogenic compounds formed during recommended cooking for fresh and processed pork.
2. A thorough literature review of published nutrition literature linking fresh and processed pork to cancer.
3. Studies to investigate the relationship of pork in diets that support healthy weight control or in the management of type 2 diabetes.

H. PUBLIC HEALTH

Research should include the areas of epidemiology, pathogenesis, prevalence, risk factor management, monitoring and measurement, and/or intervention or control strategies. 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 are encouraged even if they do not fit into a specific priority area.

1. Studies of pathogens of potential public health significance that are related to pig production and/or pork products which could include, but is not limited to, Influenza A, Hepatitis E, *Streptococcus suis*, and *Erysipelothrix*. It is desirable for these studies to quantitate exposure and assess potential risk.
2. Studies to identify, diagnose, describe the epidemiology of and/or develop interventions for emerging and re-emerging zoonotic diseases including but not limited to; Norovirus, Clostridium difficile, Toxoplasma gondii, MRSA, and others that may be associated with pigs.
3. Studies to evaluate intervention methods, including vaccination strategies, to protect humans from zoonotic diseases that may be present in 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 aerosol 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 to assess the potential for antimicrobials in land applied manure that may be taken up by plants to affect the development and/or persistence of resistance in animals consuming those plants
3. 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.
4. Studies to investigate the relationship between the uses of antimicrobials in swine and dissemination and persistence of resistant bacteria and/or elements in the environment, including soil and water.

M. GENOMICS

The National Pork Board's Animal Science Committee is initiating a comprehensive research program to ensure that the technologies generated by the International Swine Genome sequencing project is leveraged into the discovery and development of new technologies for the US pork industry. The completion of the swine genome map (sequence) provides the starting point for understanding the genetic complexity of pigs and how genetic variation contributes to complex traits like maternal efficiency, nutrient utilization and disease resistance/ tolerance. New research programs are now needed to identify individual traits and genetic networks which influence or control economically important traits such as nutrient utilization/efficiency, disease resistance, production and reproductive efficiencies, meat quality, and the interaction of these traits in production systems that ensure welfare and economic/environmental sustainability. No funding limits are set for individual proposals.

This research should focus on the development of short and long term applications for the new technologies which will enable the pork industry to compete with other proteins in international markets. For example, genetic marker assisted selection research should improve selection for conventional traits such as growth rate, feed efficiency and lean yield and enable accelerated selection for traits that are currently difficult to measure such as reproductive efficiency, feed efficiency, disease resistance and meat quality. Longer term research should enhance production efficiencies at the cellular level for all traits by improving nutrient utilization, mediating disease challenges, improving adaptability and survivability, increasing sow lifetime productivity, ensuring welfare and improving the nutrient profile and quality profile of pork.

1. Identify and evaluate comprehensive and significant genetic markers and genetic networks for economically important traits in the pork industry.
2. Validation of genetic markers and genetic networks across diverse production populations.
3. Improve selection response to economically important traits in the pork industry through marker assisted selection programs and related technologies. Develop commercial genomic tools and application technologies for the pork production sector.
4. Development of comprehensive phenotypic databases to assist with the identification of genomic markers for economically important traits in the swine industry.
5. Continued refinement and annotation of the swine genome sequence.
6. Develop a producer and industry stakeholder based real-time information system to efficiently and effectively deliver emerging genomic technologies to producers. Develop interactive information and educational technologies for the pork industry in cooperation with the US Pork Center of Excellence. This program should include the following objectives:
    a. Develop basic educational tools and information for producers relating to genomic definitions and technologies so that producers are better able to understand the emerging technologies.
    b. Assist industry with evaluation and adaptation of emerging genetic technologies (markers, selection programs, etc). Serve as a clearing house for genome related technologies, information and application.
    c. Contribute to the development of a centralized database and DNA storage system to maximize the research, discovery and value creation that results from this research investment.

d. Assist with consumer based needs for accurate real-time information and address concerns and questions regarding genomic research, for example concerns about genetic research and application. Provide the industry with science based information to address consumer concerns.

N. NUTRITIONAL EFFICIENCY

The National Pork Board Nutritional Efficiency research program has the following objectives and priorities for 2008:

- *Economically maximize production efficiencies through improved feed conversion and reduced/optimized feed costs.*
- *Assist producers to lower feed costs through improved feeding technologies and information about the use of lower cost alternative diet components.*
- *Develop comprehensive research programs to address genomic and cellular level nutrient utilization processes and capabilities in the pig.*

No funding limits are set for individual proposals. Researchers are encouraged to find matching funds and leverage existing industry resources. Projects that are multidisciplinary in their approach are strongly encouraged and will be prioritized. Additional consideration will be given to proposals that demonstrate interdisciplinary design when appropriate and inter-institutional collaboration where possible. Projects are intended to be funded on a one-year basis. Multi-year projects may be considered based on the availability of one time funds sufficient to support this and subsequent years. Consideration for funding subsequent years of multi-year efforts may also be considered based on demonstrated accomplishments of previously funded research efforts toward success of the overall research project as described in interim or final research reports, and submittal of a proposal for each subsequent year's available funding covering the new funding requested.

1. **Refinement of feeding recommendations for swine**. Development of research projects to address the following issues. New research should directly support and enhance current on-going research efforts in the industry:
   a. Estimate net energy values (NE) of co-products and alternative ingredients for use in swine diets.
   b. Describe techniques for more accurate fiber analysis and estimation of fiber digestibility in co-products and alternative ingredients.
   c. Identify enzymes, yeasts, etc that will improve the efficiency of utilization for co-products and alternative ingredients used in swine diets. Identify processing procedures that will improve the efficiency of utilization for co-products and alternative ingredients used in swine diets.
   d. Techniques to optimize relevant co-product lipid digestibility and utilization in the pig.
   e. Techniques to determine and optimize amino acid digestibility and availability in co-products and alternative ingredients.
   f. Techniques to optimize relevant co-product phosphorus digestibility and the effect of phytase on co-product digestibility.
   g. Techniques to optimize feed consumption at varying levels of DDG inclusion in swine grow-finish diets.
   h. Investigate associated reproductive responses in litter size and weight for sows in lactation and gestation fed rations including co-products.
   i. Investigate the effect on welfare, including behavior, and longevity produced when co-products are fed in the breeding herd diet.
   j. Investigate health effects, particularly the reduction in ileitis, in grow-finish hogs related to inclusion of co-products in swine diets.

2. **Alternative ingredients and ration building technologies.** Development of research projects to update the nutrient profiles and feeding recommendations for alternatives to corn and soybean meal, such as DDGs, glycerol, field peas, barley, wheat, sorghum, milk products, and others.
3. **Feed systems/innovative technologies**. Development of novel feed systems/delivery solutions to improve production efficiencies and/or address the flowability, processing-pelleting characteristics and other physical barriers to inclusion of co-products in swine diets.
4. **Product quality, consistency and variation.** Development of real-time and "truck-side" tools to measure product net energy, lysine content and/or mycotoxin contamination levels of co-products and other feedstuffs. Evaluate the effect and mitigation of anti-nutritional factors, contaminants and storage related issues associated with feed ingredients for swine including conventional feedstuffs, distillers grains and glycerol.
5. **Implications for pork quality.** Development of research projects to address pork quality issues relating to the inclusion of co-products in swine rations, particularly the effect on lipid saturation and consumer eating satisfaction for bacon and sausage products from market hogs and cull sows.
6. **Biological efficiencies for pork production systems**. Enhance swine nutrient utilization through improving cellular responses to nutrients, genomic influences on nutrient utilization, and other technological improvements.

S. SOW LIFETIME PRODUCTIVITY

The Animal Science Committee is soliciting proposals on issues affecting the lifetime productivity of the sow. The committee supports development of comprehensive research to provide producers with information and technologies to enhance the lifetime productivity of breeding females through improved production and longevity and reduced mortality. This research will focus on economically important production traits including gilt development, genetics/adaptability, nutrition, reproductive physiology and management of breeding females. No funding limits are set for individual proposals. Research topics listed below are NOT in priority order. Researchers are encouraged to find matching funds and projects that are multidisciplinary in their approach are encouraged. Cooperative arrangements with industry are strongly encouraged and will be prioritized.

1. Sow Lifetime Productivity Research Priorities

a. Use a systems approach to develop best management practices to maximize sow lifetime productivity in conventional production systems including protocols for care/management, health and welfare, nutrition, and reproduction.
b. Evaluate and develop best management practices for gilt development, using new and existing innovative approaches for gilt development to maximize sow lifetime productivity in conventional production systems. Factors to consider could include floor space, feeding systems, genetics, reproductive management/boar exposure, structural soundness, nutrition, etc,
c. Identify genetic markers and genetic networks with direct implications for sow lifetime productivity including, but not limited to the genetic effects of structure/soundness, reproductive efficiency, adaptability, disease resistance, etc.
d. Develop genomic tools for commercial applications that may be useful to optimize sow lifetime productivity, including but not limited to selection indices, marker assisted selection tools, SNP markers, etc.
e. Determine the relationship and effect of maternal structure/phenotype and lean muscle mass on sow lifetime productivity.

f. Determine the effects of nutritional profile/ration formulation, alternative/innovative ingredients, feed delivery systems, feeding protocols, etc. on sow lifetime productivity.
g. Improve sow lifetime productivity through improved/enhanced reproductive efficiency. Priorities will be given to proposals that focus on decreasing pre-weaning mortality, improving litter size weaned and mitigation of seasonal infertility.

2. Sow Housing Calculator

Revise, update and expand the existing Excel based National Pork Board sow housing calculator to include analyses for varying flooring types and management systems, including all relevant production, construction and economic inputs and resource/support materials. The current National Pork Board Sow Housing Calculator is a tool for producers considering the construction of new open housing facilities or the remodel/renovation of existing facilities. However, the current tool does not allow for the comparison of one housing alternative to another (for example, electronic sow feeders in free group housing vs free access stalls). Sow housing system options recognized as cost effective and legitimate alternatives to stalls should be included in the final evaluation tool.

3. SLP Management Guide/Information Systems

Working with in collaboration with US Pork Center of Excellence, develop the content and infrastructure for a management information system that will optimize sow lifetime productivity. This program should provide producers with technological and information needs necessary to enhance or optimize sow lifetime productivity and mitigate breeding herd mortality issues. Program components should include real time web-based information and technology systems for individual producers and should serve as a vehicle to deliver emerging technologies and educational information to the pork industry to enhance sow lifetime productivity.

W. WORKER SAFETY RESEARCH PRIORITIES:

Research should include the areas of risk management, monitoring and measurement, and/or intervention or control strategies. 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 are encouraged even if they do not fit into a specific priority area.

1. Studies to identify effective and practical interventions to protect the health and safety of workers in pork production facilities. This could include, but not be limited to, studies to identify potential engineering interventions that would reduce occupational exposure to hazards such as, but not limited to, noise, gases, and dust.
2. Studies to identify and quantitate the potential health hazards of working in pork production facilities including a comparison of different facility types.