

NATIONAL PORK BOARD
General Request for Proposals - 2009

DEADLINE: Tuesday, November 18th, 2008 – 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

N – Nutritional Efficiency
P – Pork Safety – Physical Hazards
S – Sow Lifetime Productivity

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.

STAFF MEMBERS:

Environment	Allan Stokes	astokes@pork.org	515/223-3447
Swine Health	Lisa Becton	lbecton@pork.org	515/223-2791
Animal Welfare	Sherrie Niekamp	sniekamp@pork.org	515/223-3533
Pork Safety – Pre & Post, Physical Hazards & Human Nutrition –	Steve Larsen	slarsen@pork.org	515/223-2754
Nutritional Efficiency, & Sow Lifetime Productivity	Mark Boggess	mboggess@pork.org	515/223-2606

To be considered for committee review, **all proposals must be submitted via the website by 5:00 p.m. CST on Tuesday, November 18th, 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 late-March 2008.
Project funding will begin May 1st, 2008.
Requests for second-year funding must be resubmitted.

A. ENVIRONMENT

The Environment Committee solicits proposals in the following areas only. Proposals must be submitted in the attached format to be considered. Projects may cover multiple-year efforts for completion of a whole project. If proposed projects are for completion of multi-year efforts already in-progress the proposal must include a discussion of progress and accomplishments realized from the research efforts to date toward success of the overall research effort. This may be accomplished by including copies of interim or final reports from previously funded research efforts as appendices to the proposal submitted. Proposals will be reviewed by panels for scientific soundness and for industry priority. Proposals may be returned to the investigator with suggested/requested revisions prior to making a final funding decision. Funding for accepted projects will follow final approval by the National Pork Board. No exact funding limit for each of the following areas has been established.

For information regarding this solicitation, please contact Allan Stokes by Email at AStokes@pork.org or by phone at (515) 223-3447.

Proposals are solicited in the following areas:

1. Quantify the relative contribution and water quality impacts of nutrients, pathogens, hormones and common antibiotics used in swine operations to surface and groundwater water due to land application of swine manure to crop ground compared to contributions from municipal wastewater treatment facilities. Swine manure impacts are to be evaluated 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. Contributions from municipal sewage treatment will consider both discharge of water from the sewage treatment facility and land application of bio-solids (sewage sludge).
2. Conduct a literature review in order to identify currently available (not necessarily currently employed) and technologically feasible on-farm water conservation management practices and quantify their potential effectiveness in terms of reduction in overall water consumption on an operation. The review will also identify the economic cost for installation, operation and maintenance and the economic benefits of the conservation practices. This review will address both finishing operations and sow farm operations. The final deliverable from this effort will include a document written for producers that identifying options, opportunities and challenges associated with each option and potential cost/benefits from employing each option.
3. Conduct a literature review in order to identify currently available (not necessarily currently employed) and technologically feasible on-farm energy conservation management practices and quantify their potential effectiveness in terms of reduction in overall energy consumption on an operation. The review will also identify the economic cost for installation, operation and maintenance and the economic benefits of the conservation practices. This review will address both finishing operations and sow farm operations. The final deliverable from this effort will include a document written for producers that identifies options, opportunities and challenges associated with each option and potential cost/benefits from employing each option.
4. Quantify the energy, environmental and economic impacts of utilizing manure as a crop nutrient for corn and soybeans versus commercial sources. In addition to utilization of manure in addition to commercial nutrients where those commercial nutrients are needed to meet agronomic needs, this effort should also evaluate utilization of manure as the sole source of nutrients for corn and soybean crops considering economic values of possible reduction in crop yield relative to costs associated with addition of commercial nutrients.

5. Quantify the impact that applying swine manure has on the level of organic matter, soil structure and moisture retention capacity in soils where swine manure is applied relative to soils where no swine or other manure is applied, and identify a monetary value for organic matter contained in swine manure.
6. Quantify the energy consumption, environmental (air emission, water and land quality) and economic (cost and benefit) impacts of using alternative mortality management practices including rendering, incineration, open compost piles, fully contained in-vessel compost systems and on-farm land burial. The final deliverable from this effort will include a document written for producers that identifies and quantifies each of the impacts associated with each of the alternative practices and potential cost/benefits from employing each.
7. Identify and quantify the impact that inclusion of various co-products resulting from bio-fuel (ethanol and bio-diesel) production into a corn-soybean based swine ration on nutrient levels (N,P & K) and organic content in swine manure and the generation of air emissions including ammonia, hydrogen sulfide, methane, carbon dioxide and oxides of nitrogen from manure storage. This effort will evaluate inclusion of co-products at varying percentages of the ration formulation for both sows and finishing pigs.

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. For further information regarding this solicitation can be directed to Lisa Becton by email at lbecton@pork.org or by phone at 515-223-2791.

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

C. ANIMAL WELFARE

The Animal Welfare Committee is requesting proposals on issues affecting the welfare of swine. Research topics are listed below in priority order and proposals must address at least one of the specific research topics of interest listed. 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. Further enquiries can be directed to Sherrie Niekamp by email sniekamp@pork.org or by phone: 515/223-3533.

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 and evaluate new effective methods of euthanasia for each age of pig.
 - b. Characterize the ballistics of firearms needed for safe and humane euthanasia.
 - c. Evaluate the physiology and physical components of success for achieving timely loss of consciousness and death using blunt force trauma as a method of euthanasia for suckling pigs

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. Develop and evaluate new and innovative alternative housing and management systems for gestating sows not currently in use in the U.S., that optimize individual well-being, management/labor, lifetime productivity and reproductive performance/efficiency.
 - b. 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.
 - c. 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.

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 thermal needs (bedding, boarding, misting) of weaned or feeder pigs, market pigs, or adult sows and boars during transport in various temperatures.
 - d. Determine the needs of weaned pigs or feeder pigs during transport in regards to length of transport, ramp design, ventilation, etc.

- e. 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 – Pre-Harvest

*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 isolation methods for enumerating Salmonella spp or serotype before and after intervention(s) to find out the effectiveness of the intervention(s).
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. Determine the amount of Salmonella spp or serotype found on the carcass or in the final product to address the impact of lairage reduction program(s).
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 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

Post-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.

1. Salmonella research is the top priority for the industry. Specific topics of interest with regard to Salmonella are described below, but other pathogens, such as toxoplasma, campylobacter and yersinia, may be considered (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.

G. HUMAN NUTRITION

Human nutrition research supports pork's role in a healthful diet according to the principles of the US Dietary Guidelines. Co-funding from organizations of similar interests, including other meat organizations, is encouraged. No exact funding limit for each of the following areas has been established. Priorities (not listed in any order) include:

- Research examining the benefits of high-quality animal protein (including pork) in healthy diets or for weight control.
- Analysis of national consumption databases (such as the National Health and Nutrition Examination Survey) to determine actual US pork consumption by various demographic groups.
- Analysis of existing epidemiological studies to examine any associations between processed or fresh pork consumption and cancer.
- Research exploring novel health benefits of pork's nutrient composition.
- Research exploring the role of n-3 enhanced pork products on human health.

N. NUTRITIONAL EFFICIENCY

The National Pork Board Swine Nutritional Efficiency program prioritizes research to assist producers to reduce or optimize feed costs. This effort targets areas related to nutritional efficiency and is directed through a stakeholder consortium coordinated by the National Pork Board Animal Science Committee and a Feed/Nutrition Advisory Group. The primary objectives of the program are:

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

Proposals must be submitted following the attached format to be considered. Projects are intended to be funded on a one-year basis. Multi-year projects may be considered based on the project priority and 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. Researchers are encouraged to find matching funds and projects that are multidisciplinary in approach are strongly encouraged and will be prioritized. Researchers are reminded to submit simple, accurate, clearly understood budgets per the on-line application process that adequately meet the requirements as specified.

All eligible proposals will be reviewed by expert panels for scientific validity. Funding recommendations will be made by the stakeholder consortium based on pork industry priority. Proposals may be returned to the investigator with suggested/requested revisions prior to making a final funding decision. Funding for accepted projects will follow final approval by the National Pork Board.

For information regarding this solicitation, please contact Mark Boggess, Ph.D. by Email at mboggess@pork.org or by phone at (515) 223-2606

Funding Categories:

Research Priorities (in Priority Order):

- a. **Biological efficiencies for pork production systems.** Development of research projects to address the following issues. New research should directly support and enhance current on-going research efforts where applicable in the industry for both growing pigs and breeding stock:
 - i. Enhance/improve swine nutrient utilization through improved metabolic and cellular responses.
 - ii. Develop/enhance or adapt genomic technologies to enable producers to select for and improve nutrient utilization.
 - iii. Develop technological improvements that systematically improve the efficiency of nutrient utilization through improved growth or lactation performance or other related performance measures.
 - iv. Develop technological improvements that systematically improve the efficiency of nutrient utilization through adaptation of germ plasm to specific production environments, adaptation of alternatives to integrated feed programs and other related technologies.

- b. **Alternative ingredients and ration building technologies.** Development of research projects to update the nutrient profiles and feeding recommendations for today's national swine herd for ingredients that are alternatives to corn and soybean meal, such as DDGs, glycerol, field peas, barley, wheat, sorghum, milk products, and others. Develop integrated, systems based, technologies to evaluate ration composition value and optimize ingredient and nutritional profiles in real time for producers.
- c. **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 where applicable in the industry:
- i. Estimate net energy values (NE) of co-products for use in swine diets.
 - ii. Describe techniques for more accurate fiber analysis and estimation of fiber digestibility in co-products. Identify enzymes, yeasts, etc that will improve the efficiency of utilization for co-products used in swine diets.
 - iii. Techniques to optimize relevant co-product lipid digestibility and utilization in the pig.
 - iv. Techniques to optimize relevant co-product Lysine digestibility and availability.
 - v. Techniques to optimize relevant co-product phosphorus digestibility and the effect of phytase on co-product digestibility.
 - vi. Techniques to optimize feed consumption at varying levels of DDG inclusion in swine grow-finish diets.
 - vii. Investigate associated reproductive responses in litter size and weight for sows in lactation and gestation fed rations including co-products.
 - viii. Investigate the effect on welfare, including behavior, and longevity produced when co-products are fed in the breeding herd diet.
 - ix. Investigate health effects, particularly the reduction in ileitis, in grow-finish hogs related to inclusion of co-products in swine diets.
- d. **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.
- e. **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.

Summary Notes

- Proposals will be prioritized for funding by the National Pork Board Nutritional Efficiency Consortium based on scientific review and relevance to stakeholder application and need.
- Multiple year projects will be considered with sufficient justification.
- Additional consideration will be given to proposals that demonstrate interdisciplinary design when appropriate and inter-institutional collaboration where possible.

P. PORK SAFETY – Physical Hazards and Abscesses

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. 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.

S. SOW LIFETIME PRODUCTIVITY

The Animal Science Committee is soliciting proposals on issues affecting the lifetime productivity of the sow. Ultimate funding is contingent on final approval by the National Pork Board of Directors and AMS. The Animal Science 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.

Research topics are listed below NOT in priority order. No exact funding limit for each of the following areas has been established. 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. Further enquiries can be directed to Mark Boggess by email mboggess@pork.org or by phone: 515/223-2606.

S1. Sow Lifetime Productivity Research Priorities

- S1.1** 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.
- S1.2** Evaluate and develop best management practices for gilt development, using new and existing innovative approaches for gilt development, including but not limited to floor space, feeding systems, genetics, reproductive management/boar exposure, structural soundness, nutrition, etc, to maximize sow lifetime productivity in conventional production systems.
- S1.3** 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.
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.
- S1.4** Determine the relationship and effect of maternal structure/phenotype and lean muscle mass on sow lifetime productivity.
- S1.5** Determine the effects of nutritional profile/ration formulation, alternative/innovative ingredients, feed delivery systems, feeding protocols, etc. on sow lifetime productivity.
- S1.6** 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.
- S1.7** Evaluate the relationship between hoof lameness and integrity and ultimate performance and culling decisions for gestating sows. Develop a prediction protocol to predict ultimate disposition based on hoof lesion scores in gestating sows.

S2. Sow Housing Calculator

- A2.1** Revise, update and expand the existing Excel based NPB 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 NPB 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.