

To view this email as a web page, click [here](#).



You are receiving this e-newsletter from the Pork Checkoff because you subscribe to other Pork Checkoff information vehicles. You will continue to receive this e-newsletter about every 60 days unless you wish to Opt-Out here.

[UNSUBSCRIBE](#)

[UPDATE PROFILE](#)

Welcome

Welcome to this issue of Research REVIEW brought to you by Pork Checkoff. The purpose of this e-newsletter is to give you a user-friendly way to learn more about research funded by the Pork Checkoff, what it means to the industry, and where to go if you want more information. We hope you find this publication useful. Feel free to forward to others. Archived issues are found [here](#).

[ANIMAL SCIENCE](#)

Includes pork quality, reproduction, nutrition and genetics

[ANIMAL WELL-BEING](#)

Includes animal assessment, handling and transportation, sow housing, euthanasia and animal space requirements

[ENVIRONMENT](#)

Includes manure management, air quality, water quality, water use/conservation and carbon footprint

[HUMAN NUTRITION](#)

Includes dietary nutrition, food preparation technology and ingredient health implications

[PORK SAFETY](#)

Includes pre- and post-harvest safety issues, pathogens and intervention technologies

[PUBLIC HEALTH](#)

Includes antibiotic use and resistance, disease transmission, risk assessment and worker health and safety

[SWINE HEALTH](#)

Includes domestic and foreign swine diseases, swine ID, biosecurity, disease surveillance and emergency preparedness.

[ONLINE TOOL FOR FINDING CHECKOFF-FUNDED RESEARCH](#)



RESEARCHER SPOTLIGHT:

[Dr. Brian Kerr, USDA/ARS](#)

What is your current role at USDA/ARS? How did your career bring you to this position?

I have been at the USDA's Agricultural Research Service (ARS) since January 2001 as both Research Leader and now Lead Scientist. My main work focuses on the project entitled *Animal and Manure Management for Sustainable*

Production and Reduced Environmental Impact within the National Laboratory for Agriculture and the Environment. I evaluate the impact of feed formulation on nutrient utilization, excretion and gas emissions in finishing swine. Research projects directly relating to Checkoff Funds include the evaluation of biofuel co-products (crude glycerin and DDGS) as energy sources, ability of feed additives to improve energy and nutrient utilization of diets containing DDGS, and the impact of lipid source and oxidation level on energy utilization in growing pigs. Prior to working at the USDA, I worked 3 years at Supersweet Feeds in Minneapolis and 10 years with BioKyowa in St. Louis.

How long have you been involved in swine research?

I have been conducting swine research for 25 years, excluding graduate research at the University of Illinois under Dr. Robert Easter.

What Checkoff-funded research are you most proud of?

Two key areas of research that were supported by Checkoff funds include research evaluating the caloric value of crude glycerin and corn co-products in growing swine, both of which have increased in supply over the last several years. Our data indicate that both of these co-products are valuable as energy sources to growing-finishing pigs.

How do pork producers benefit from your research?

In a nutshell, my research is designed to improve the digestion and utilization of nutrients within various feedstuffs in an effort to maintain or improve pig productivity and reduce excretion of nutrients and gasses into the environment. Through my collaboration with other scientists, we have hopefully provided valuable data to the swine industry on the nutritional value of various feedstuffs and provided information on how their use may impact manure composition, and consequently manure value, as well as gas emissions.

Why do you think it's important for pork producers to continue to fund swine research?

I think it's very important for pork producers to continue funding swine research because they need scientific results on relevant topics in order to make informed decisions within their pork production operations. This is why it's so important for pork producers and swine researchers to work together.

What else?

Swine nutrition has always been an exciting field and I find it very rewarding to collaborate with other key scientists, swine producers, and the National Pork Board in finding answers to issues related to improving the nutritional efficiency of pork production.

Click [here](#) to go to a recent study on DDGS by Dr. Kerr.



Study Name: Identification of Genetic Markers Associated with Sow Lifetime Productivity

Principal Researcher: Daniel Ciobanu, University of Nebraska

Quick Take: Modern sows are more productive than ever before. However, sow culling and replacement rates remain high and have a serious economic impact of whole farm productivity. Among the reasons for culling, reproductive failure is the most common. Length of productive life is a moderately heritable trait, but it has a relatively high variance leading to substantial genetic variation in most populations. This trait is quite complex and believed to be affected by many genes with relatively small to moderate effects. As a consequence, the response to traditional selection methods is low; generation intervals will be long and accuracy of identifying genetically superior young animals will be reduced. Therefore, this trait is one for which application of genomic tools will be especially helpful. Several areas associated with developmental and sow reproductive traits as well as with sow lifetime reproductive and productive traits were identified using genome-wide association studies. This research will provide a molecular tool that will reduce culling rates, sow death losses, and enhance sow lifetime productivity.

[To learn more, click here.](#) 📄

Study Name: Evaluation of Pork Quality from Sows Fed Diets with DDGS

Principal Researcher: Mickey A. Latour, Purdue University

Quick Take: It is well known that feeding distillers dried grain with solubles (DDGS) to growing and finishing swine can result in less than desirable carcass fat quality. However, the overarching goal of this work was to determine if feeding DDGS at 0%, 15% or 30% during gestation and/or lactation altered sow performance and/or final products, namely bratwurst and breakfast links. Findings showed no differences in the relative amount of fat accumulated during the entire study or the iodine levels of the carcass fat. Perhaps that aided in not seeing differences in bratwurst and/or breakfast links preference of the actual product i.e., eating experience. There were no differences noted in the breakfast links by the untrained panelist. However, the initial purchase or likelihood of purchase favored the control bratwurst, i.e., 58% agreement vs. the DDGS groups which was around 40% in those that received the 15% DDGS diet. It was in the 30% range for the sows fed the 30% DDGS diet. This would indicate that initial "purchase" of bratwurst could be affected in bratwurst coming from DDGS-fed sows.

[To learn more, click here.](#)

BACK TO TOP



Study Name: Effectiveness of Non-Penetrating Captive Bolt and Restraint for Piglet Euthanasia

Principal Researcher: Tina Widowski, University of Guelph

Quick Take: Blunt force trauma (BFT) remains the most commonly practiced method for euthanasia of piglets; but the effectiveness of the technique is significantly limited by the size of the piglet, and is not recommended for piglets greater than 12 lbs. When properly performed BFT has been shown to be humane, although it may not be aesthetically or emotionally acceptable for many stock people. Therefore alternative euthanasia methods for piglets are being investigated. The project reported here investigated the effectiveness of the modified design for euthanasia of newborn piglets and its potential to be used on larger piglets up to 9 kg (20 lbs.). In trials using non-penetrating captive bolt (NPCB), the results indicated that the NPCB can effectively induce cardiac arrest in piglets up to 9 kg and that it caused brain lesions known to be associated with loss of consciousness. The next stage of research will be testing the effectiveness of the NPCB on conscious piglets. Due to the size of the piglets within the next trial (up to 9 kg), a restraint device will also be designed to ensure the safety of the operator and the piglet.

[To learn more, click here.](#)

Study Name: Evaluation and Application of Humane Hypoxic Euthanasia for Nursery Pigs

Principal Researcher: Terry Engle, Colorado State University

Quick Take: Humane euthanasia in a hypobaric chamber will allow swine producers to euthanize animal's on-farm in a manner that may be less stressful to the animal, consistent, and acceptable to the public, and less stressful for workers. It furthermore shows promise as a humane stunning method for slaughter, since the point is to produce hypoxia without asphyxia. Based on previous research conducted at Colorado State University (MacGregor, et al., 2008), this experiment examined the efficacy of an on-farm hypobaric chamber that delivers the most effective and humane form of on-farm euthanasia. Three experiments were conducted utilizing seventy nursery weight pigs. Twelve pigs were euthanized prior to the main experiment to establish appropriate ascension parameters for the main experiment. Electroencephalogram data indicated that pigs euthanized via CO₂ reached a complete isoelectric state faster than pigs euthanized via hypobaric hypoxia (HH) indicating a more

rapid death. However, pigs euthanized via CO₂ gasped more but had less bouts of paddling than pigs euthanized via HH. Pigs with more CO₂ in their blood, coupled with higher incidents of gasping indicates that CO₂ euthanized pigs may have experienced a greater amount of asphyxiation prior to death. However, pigs euthanized via hypobaric hypoxia had more lung lesions and HH was not effective in euthanizing every piglet which raises questions about its effectiveness as a consistent method of euthanasia.

[To learn more, click here.](#)

[BACK TO TOP](#)



Study Name: Reducing the Environmental Footprint of Pig Finishing Barns

Principal Researcher: Larry Jacobson, University of Minnesota

Quick Take: A 2400-head double wide, tunnel-ventilated, fully slatted, deep pit finishing barn was used as the reference facility to compare energy use and air emissions with the new greener pig barn (GPB) housing design. The tunnel-ventilated barn was used as a baseline in this study because it has been the most commonly built pig finishing facility in the upper Midwest for the past 5 to 10 years. It is estimated that over 80% of all pig marketed in the upper Midwest are either grown in a tunnel-ventilated or a deep-pit, fully slatted, curtain-sided barn. Results from the project indicate that current facilities in the upper Midwest can be modified or managed to reduce energy inputs. Results also indicate that there are alternatives to the current finishing facilities in the Midwest that could result in reduced energy and emissions per pound of meat produced while still being economically viable. Construction and monitoring of the design housing concepts laid out in this report is a critical next step in moving the industry forward in sustainable pig finishing production.

[To learn more, click here.](#)

Study Name: Building Design and Cost to Reduce Energy and Emissions by Cleaning and Recirculating Room Air

Principal Researcher: Richard Nicolai, South Dakota State University

Quick Take: Modern swine production is being challenged to reduce air emissions and energy consumption. A novel approach is to remove the hydrogen sulfide, ammonia, methane, volatile organic compounds and moisture from the air, and then recycle the air back through the swine barn. This type of system would reduce the amount of energy used for heating in winter. The objectives of the study included designing a practical system that would clean the exhaust air from a swine finishing barn, remove the moisture added by the pigs and recirculate the air back into the barn. The capital and operating cost of the proposed design would be compared to a tunnel-ventilated finishing barn. The capital and operating costs of an air recirculating type of pig finishing barn were compared to tunnel-ventilated barn. The capital cost estimated for an air-recirculating barn was \$590 per pig space compared to \$250 for a tunnel-ventilated barn. Annual energy operating cost for the tunnel-ventilated barn would be \$1.54 per pig place. The proposed air-recirculating barn of the same size would have an estimated annual energy cost of \$6.21 per pig place. The difference is due to the electricity required for the heat pump motors. After combining improved pig performance, increased capital cost and energy costs, the projected payback period for an air-recirculating barn is 10.9 years, but improved pig health could make this a worthy investment.

[To learn more, click here.](#)

[BACK TO TOP](#)



Study Name: Nitrite/Nitrate Concentrations in Cured Meat Products and Non-Meat Foods at Retail

Principal Researcher: Jimmy Keeton, Texas Tech University

Quick Take: Nitrite/nitrate contents of U.S. cured meat products have remained low since the last national survey in 1997. It appears that the current USDA regulations and manufacturer's processing procedures are consistently controlling the levels of nitrite/nitrate in cured meat products and continue to be effective for minimizing their contribution to the dietary nitrite/nitrate load. Based on this survey of five regions of the United States, regional variation in the nitrate content of vegetables may need to be taken into consideration when developing predictions based on their consumption. This variation might be of sufficient magnitude to alter epidemiological predictions if not considered appropriately. In addition, nitrate/nitrite concentrations in municipal drinking water should be considered when evaluating their potential contribution to nitrite/nitrate load.

[To learn more, click here.](#)

[BACK TO TOP](#)



Study Name: Survival of PRRS Virus and Porcine Circovirus on Pork and Pork Products

Principal Researcher: Devi P. Patnayak, University of Minnesota

Quick Take: Porcine circovirus associated diseases (PCVAD) were first identified in the early 1990s. Since then it has been estimated that PCVAD costs U.S. producers an average of \$3 to \$4 per pig (Gillespie and others 2009). The disease mainly affects pigs between 5 and 10 weeks of age (Ellis and others 1998). This is the first study on the viability of PCV2b in pork meat. Several researchers have reported the occurrence of PCV2b in meat and internal organs and have suggested that they could be instrumental in the spread of PCV2b in the swine population. But a majority of reports concern DNA copies and not live virus. Our data indicate that PCV2b can survive in meat at room temperature (25°C) for up to 48 hours, at 40°C for up to 6 days, and for 30 days at -200°C indicating that the surviving time of PCV2b in fresh pork will depend on temperature of storage. It further suggests that fresh pork contaminated with PCV2b may have the potential to infect vulnerable pigs and also humans undergoing xenotransplantation. This increases the risk of infection in these immunosuppressed individuals. We are in the process of conducting studies to determine virus survival during the process of preparing pork products e.g., bacon, sausage, acid sausage and ham.

[To learn more, click here.](#)

Study Name: Molecular Basis of Salmonella Competition in Broth Culture

Principal Researcher: Randall S. Singer, University of Minnesota

Quick Take: *Salmonella* remains an extremely important bacterial pathogen to the swine industry. It is a significant pathogen affecting swine health and also represents one of the most important foodborne pathogens affecting people. Unfortunately, conclusions about *salmonella* transmission are highly dependent on the performance characteristics of these cultivation methods, and recently, we quantified a disturbing fact: the probability of detecting a specific *salmonella* strain in a sample might have very little to do with its concentration in the sample but more to do with its ability to compete in

the cultivation media and with the specific mixture of *salmonella* strains present in the sample. The overall objective of this project was to characterize the bias that cultivation media has on *Salmonella* detection and enumeration. This study confirmed what we had previously found in a pilot study: that the probability of detecting a specific *Salmonella* strain in a sample might have very little to do with its concentration in the sample but more to do with its ability to compete in the cultivation media and with the specific mixture of *Salmonella* strains present in the sample.

[To learn more, click here.](#)

[BACK TO TOP](#)



Study Name: Comparison of toxigenic *Clostridium difficile* isolates from swine and humans

Principal Investigator: Roger B. Harvey, USDA/ARS

Quick Take: In recent years, there has been increased incidence and severity of human disease associated with the bacterium *Clostridium difficile* (Cd). In this study, we looked into the prevalence of Cd in a human population that lived at the same locations as pigs. Besides consuming pork produced in this integrated system, a portion of the humans were swine workers. We compared the prevalence of Cd between workers and non-workers to see if there was an occupational risk from regular contact with swine. We also wanted to evaluate the genetic similarity or relatedness of Cd isolates from swine compared to human isolates. We isolated 38 Cd from 668 human wastewater samples. There was no difference between swine workers and non-workers nor were there differences in human isolations based on farms where swine had high Cd prevalence. These results suggest that risk of Cd infection is not an occupational one and there does not appear to be evidence that Cd is food-associated.

[To learn more, click here.](#)

[BACK TO TOP](#)



Study Name: Contribution of Prior SIV Infection in Enhancing Secondary *H. parasuis*

Principal Investigator: Crystal Loving, USDA/ARS

Quick Take: Porcine respiratory disease complex (PRDC) is a multifactorial disease and swine influenza virus (SIV) is a known contributor to it and may predispose pigs to secondary bacterial infection. To determine if SIV predisposes or enhances secondary *Haemophilus parasuis* (Hps) infection, studies were performed to evaluate disease severity to Hps challenge in pigs previously infected with SIV. Two separate studies were performed in which pigs were challenged with Hps 5 or 10 days following SIV infection. In the first study, 4-week old pigs were challenged with SIV and 10 days later, infected with Hps. There was no significant difference in Hps colonization in SIV/Hps-infected or Hps-only infected pigs, although host immune responses were significantly increased in the SIV/Hps group compared to the Hps- or SIV- alone groups. In the second study, in an attempt to bypass maternal immunity, 8-week old pigs were used. Pigs were challenged with SIV and then 5 days later, challenged with Hps. Hps colonization 1 day following Hps challenge was not significantly affected by prior SIV infection, nor were host immune responses significantly different between SIV/Hps challenged pigs compared to Hps-only

[To learn more, click here.](#)

Study Name: Assessment of the Economic Impact of PRRS Virus on U.S. Pork Producers

Principal Investigator: Derald Holtkamp, Iowa State University

Quick Take: An economic analysis published in 2005 estimated that productivity losses from clinical porcine reproductive and respiratory syndrome (PRRS) virus infections cost U.S. pork producers \$560 million dollars annually. The primary objective of the 2011 study was to estimate the current economic impact of PRRS virus in the U.S., taking into account the noted changes in the industry. The study estimated the total cost of PRRS in the U.S. national breeding and growing pig herd at \$664 million annually (\$1.8 million per day). The 2011 study differed most significantly from the 2005 study in the allocation of losses between the breeding and the growing pig herd. Specifically, losses in the breeding herd accounted for 12% of the total cost of PRRS in the 2005 study compared to 45% in the current analysis. Differences between the 2005 and the 2011 studies may be attributed to changes in the prevalence of PRRS virus and incidence of outbreaks, production and animal health management practices, inflation and other pathogens that have emerged since 2005 such as porcine circovirus type 2 (PCV2).

[To learn more, click here.](#)

[BACK TO TOP](#)

 **Online Tool for Finding Checkoff-Funded Research**

To search for additional Pork Checkoff-funded research studies, [click here.](#)

If you know someone who would like to receive Research REVIEW or you want to be removed from this newsletter distribution, call the Pork Checkoff Service Center at (800) 456-7675 or email Mike King, editor, at mking@pork.org

 2011 National Pork Board, Des Moines, IA USA
This message funded by America's Pork Checkoff program.

[privacy policy](#)

This email was sent by: **National Pork Board**
1776 NW 114th St Des Moines, IA, 50325,
Visit us at: pork.org