

**Written Testimony of the
National Pork Producers Council**

On

Agricultural Research

**Before the
House Committee on Science, Space &
Technology Subcommittee on
Research and Technology**

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Introduction

The National Pork Producers Council (NPPC) is an association of 43 state pork producer organizations that serves as the global voice for the nation's pork producers. The U.S. pork industry represents a significant value-added activity in the agricultural economy and the overall U.S. economy. Nationwide, more than 60,000 pork producers marketed more than 118 million hogs in 2016, and those animals provided total cash receipts of nearly \$240 billion. Overall, an estimated \$23 billion of personal income and \$39 billion of gross national product are supported by the U.S. pork industry.

Iowa State University economists Daniel Otto, Lee Schulz and Mark Imerman estimate that the U.S. pork industry is directly responsible for the creation of more than 37,000 full-time equivalent pork producing jobs and generates about 128,000 jobs in the rest of agriculture. It is responsible for approximately 102,000 jobs in the manufacturing sector, mostly in the packing industry, and 65,000 jobs in professional services such as veterinarians, real estate agents and bankers. All told, the U.S. pork industry is responsible for nearly 550,000 mostly rural jobs in the United States.

U.S. pork producers today provide 25 billion pounds of safe, wholesome and nutritious meat protein to consumers worldwide, and exports add significantly to the bottom line of each U.S. pork producer. U.S. exports of pork and pork products totaled 2.3 million metric tons – a record – valued at \$5.94 billion in 2016. That represented almost 26 percent of U.S. production, and those exports added more than \$50 to the value of each hog marketed. Exports supported approximately 110,000 jobs in the U.S. pork and allied industries.

Importance of Research

The United States is the lowest-cost and most technologically innovative producer of food in the world; it is the globe's top exporter of agricultural products and has the safest food on the planet. And it's that way because of its historical commitment to research.

That commitment became particularly prominent in the 1950s, following declines in the number of farms and farmers and the population booms that came after each of the two world wars. (A popular 1919 song was “How Ya Gonna Keep ‘em Down on the Farm (After They’ve Seen Pree)?”). In 1910, there were 92.2 million Americans, 6.4 million farms and 32 million farmers; by 1950, there were 161.3 million people, 5.6 million farms and 25 million farmers. (Today, there are about 2 million farms and 6.6 million farmers for a U.S. population of 330 million.)

The country needed to find new and better ways to produce more food on fewer farms for a burgeoning citizenry, not only in the United States but in the more interconnected world. (Prior to World War II, the United States was fairly isolationist, its one-year and seven-month involvement in the Great War notwithstanding.)

That prompted a significant increase in agricultural research investment, from both the public and private sectors and in terms of production practices and innovations. The era saw scientific developments such as disease-resistant crops, hybrid plants and new pesticides and research that supported increased use of commercial fertilizers and anhydrous ammonia to boost crop yields. It was in the years immediately after World War II and into the ‘50s that saw a significant transition to “modern” machinery. It wasn’t until 1954, for example, that the number of tractors on farms exceeded the number of horses and mules.

Much of the work then was being conducted by plant scientists at land-grant colleges and at the few federal research facilities that existed, and it was at this post-war time that agricultural production – thanks in large part to research and development – began to soar. In fact, since 1948, U.S. agricultural productivity has more than doubled.

In 1953, the Agricultural Research Service (ARS) was established in the U.S. Department of Agriculture to coordinate the research functions of various departments within the agency. (Its predecessor, the Agricultural Research Administration, which was established in 1942, also oversaw research from a number of bureaus, including the

bureaus of Animal Industry, Dairy Industry and Plant Industry and the Office of Experiment Stations.) In 1954, USDA established the Plum Island Animal Disease Center (PIADC), which conducts research on animal pathogens to protect farmers, ranchers and the national food supply.

The U.S. pork industry has been a strong supporter, funder and user of agricultural research, which plays a critical role in helping America's pork producers raise healthy animals and produce safe, wholesome and nutritious pork.

The National Pork Board, federally established by the Pork Promotion, Research and Consumer Information Act of 1985, spends a significant amount of its annual budget on research. In 2016, for example, it funded 95 research projects, spending more than \$7.1 million. Over the past 10 years, it has funded 851 projects at more than \$61.4 million – most by university researchers but some with ARS researchers.

In 2015, the National Pork Board, through a one-time \$15 million research grant over five years, established the Swine Health Information Center (SHIC) to protect and enhance the health of the U.S. swine herd in part through targeted research investments that help minimize the impact of disease threats.

Last year, for example, SHIC funded a project to help define disease introduction risks that come from importing feedstuffs and feed components. It has preliminary results for Senecavirus A (a surrogate for Foot-and-Mouth Disease), Bovine Viral Diarrhea virus (a surrogate for Classical Swine Fever) and Bovine Herpes Virus-1 (a surrogate for Pseudorabies). In all, it funded 21 proposals at U.S. universities, one at a biotechnology company and one at Canada's national animal health laboratory. One of the preliminary results shows that virus could survive in certain feedstuffs shipped from Asia to the United States.

SHIC also is continuing to work on nationwide operational disease preparedness through its Rapid Response Program, which is developing a corps of epidemiological

investigators to respond to emerging, transboundary and endemic swine diseases. It has a cooperative agreement with USDA to help fund rapid response investigations, if the agency's participation is approved by the herd owner(s) dealing with a disease.

Although research is vital to improving many aspects of pork production, the most critical and immediate need for the industry involves swine diseases.

Pork Industry Research

One disease that has garnered a lot of research attention is Porcine Reproductive and Respiratory Syndrome (PRRS), a viral disease characterized by two overlapping clinical presentations: reproductive impairment or failure in breeding animals; and respiratory disease in pigs of any age. PRRS is the most economically significant disease now affecting U.S. pork production.

Although reported initially in only a few countries in the late 1980s, PRRS now occurs worldwide in most major hog-raising countries. PRRS is prevalent in the United States and exists both in epidemic and endemic forms.

Over the past 20 years, there has been much research on the PRRS virus. Although much now is known about it, details on control of the disease for all types of hog-raising operations are far from complete. Pork industry consolidation over the past 15 years has led to entire production systems being designed around strategies for controlling or eliminating the disease.

PRRS also serves as an example of coordination between the public and private sectors, with the National Pork Board funding 242 projects totaling more than \$15.5 million on the disease between 1997 and 2016 and working with USDA on two PRRS Coordinated Agricultural Projects (CAPs) – one in 2004 and the other in 2008 that led to advancements in PRRS research.

Another collaborative research effort is the PRRS Host Genetics Consortium, which was initiated in 2007 specifically focusing on the underlying genetics of PRRS and how to better understand the exact mechanism of PRRS action as a way of finding new and novel solutions for the disease. It brought together the National Pork Board, the PRRS CAPs, USDA's Agricultural Research Service and National Institute of Food and Agriculture, Genome Canada, private companies and universities to conduct multi-year studies to understand how host genetics influence the outcome of PRRS virus infection. It, too, led to many advancements in the understanding and discovery of the genetic basis for PRRS resistance, which, in turn, has led to further research and discovery of a PRRS-resistant pig.

The private sector also looked to the public sector for help when the first case of H1N1 influenza was identified in a person in Mexico in the spring of 2009. The misnamed Swine Flu quickly moved to the United States and soon became a pandemic. Many U.S. trading partners closed their markets to U.S. pork.

To restore consumer confidence in pork and to get U.S. pork exports flowing again, the industry turned to researchers at USDA. The agency's Agriculture Research Service conducted a study to determine if H1N1 caused illness in pigs similar to that caused by classic influenzas and to determine if the virus could be spread to muscle tissue. Pigs were inoculated with the novel H1N1 virus. The study found that live H1N1 was only detected in the respiratory tract of infected pigs; the virus did not spread and replicate in other tissues. Most importantly, the virus did not spread to meat, confirming that pork from infected and recovered pigs was safe to eat. ARS's quick response undoubtedly saved pork producers millions of dollars in lost revenue.

The U.S. pork industry also worked cooperatively with the American Association of Swine Veterinarians to assure that producers and veterinarians had the latest information and science on H1N1. Additionally, NPPC and the National Pork Board worked with USDA's Animal and Plant Health Inspection Service (APHIS) to help shape guidelines so the government response was proportionate to the disease risk. The pork industry also

worked with the Centers for Disease Control and Prevention (CDC) and with the Department of Health and Human Services to get the word out to the public that pork was safe to eat.

During the crisis, state pork associations worked with their respective state veterinarians. The USDA APHIS plan provided guidance to the state veterinarians, and the state pork associations worked to ensure that interstate movement of pigs would not be affected by different state interpretations of the same plan. They also encouraged their state veterinarians to include the state public health veterinarian in planning for H1N1 in a pig herd.

A more recent challenge – and one that brought to light the need for research on emerging diseases – was the outbreak of Porcine Epidemic Diarrhea Virus (PEDV), which mostly affects baby pigs.

Endemic in many parts of the world, including in Asia, the virus first was detected in the United States in the spring of 2013. By the fall of that year, it had killed 1.4 million piglets. (When it finally subsided in the United States in late 2014, the disease had killed between 8 million and 10 million pigs at significant cost to producers and higher pork prices for consumers.)

Researchers at Kansas State University (KSU) confirmed pig feed as a path of transmission, something novel for viruses. They also determined the minimum amount of virus in feed that would lead to infection.

The researchers scrutinized the feed production process and discovered that forming feed into pellets using temperatures of at least 130° F killed the virus, rendering the feed safe. Other solutions, such as treating feed with medium chain fatty acids, also were discovered to prevent infection. As a result, new feed processing steps for maintaining virus-free feed were implemented nationally.

The researchers at KSU played a critical role in containing the outbreak. The cumulative incidence of PEDV infections dropped from 56 percent in 2013-2014 to 6 percent in 2015-2016.

But the disease still is lurking out there – Canada has had outbreaks recently – and the need still exists for ways to control, treat and eventually eradicate it.

Although KSU was successful with PEDV, the likelihood of identifying the pathway of introduction for production diseases – not classical foreign animal diseases such as Classical or African Swine Fever – is extremely small given the breadth of inputs the industry gets through foreign trade. No doubt, there will be more foreign production diseases that will enter the United States.

The U.S. pork industry recognizes that it can't expect USDA, alone, to protect pigs from emerging diseases (the resources necessary to do so are not available), and it has taken steps to do its part. The National Pork Board, through the Pork Checkoff, for example, dedicated more than \$1.5 million for research on PEDV. But it is apparent that, while much has been learned about the virus, a significant research effort is needed to adequately control it and to prepare for other emerging diseases. The U.S. pork industry and U.S. agriculture remain vulnerable to many diseases.

This was recognized by the Blue Ribbon Study Panel on Biodefense, co-chaired by former Department of Homeland Security Secretary Tom Ridge and former Sen. Joe Lieberman, in its October 2017 report, highlighting the need for improving the U.S. system for protecting the U.S. livestock herd and the nation's food supply from foreign animal diseases (FADs.)

An FAD of particular concern to the U.S. pork industry – and to the cattle, sheep, dairy, corn and soybean sectors – is Foot-and-Mouth Disease (FMD).

The disease is one of the most economically devastating FADs affecting animal agriculture. It is an infectious and sometimes fatal viral disease that affects cloven-hooved animals, including pigs and cattle. It is easily spread through the air, contact with contaminated equipment and by predators. (It is not a human health threat.)

Endemic in Africa, Asia, some South American countries and the Middle East, the FMD virus has seven viral serotypes and more than 60 subtypes, with wide strain variability. Sporadic outbreaks with different types continue to pop up in countries around the world.

Increased travel and trade between affected countries make the United States increasingly vulnerable to introduction of the disease. The country also must confront the possibility of terrorists using FMD as a weapon to inflict significant damage to the U.S. economy and affect food availability.

An outbreak today of the disease, which last was detected in the United States in 1929, likely would cripple the entire livestock sector. U.S. export markets for meat and dairy products would close immediately. In addition to causing harm to production animal agriculture, the economic consequences undoubtedly would ripple throughout the entire rural economy, from input suppliers to packers and from processors to consumers. USDA APHIS recently changed its policy on managing FMD from “stamping out” to using vaccine to limit the spread. The policy change was endorsed by the U.S. livestock industry as a less expensive and more practical alternative given the enormous size of the U.S. livestock herd and the movement of livestock around the country.

But the United States currently does not have enough FMD vaccine available nor could a sufficient quantity be obtained in time to implement an effective control program. The U.S. pork industry is urging Congress to establish and fund through the next Farm Bill a vendor-managed vaccine bank to house the doses necessary for the initial stages of an outbreak and the capacity to produce additional doses that will be needed to control the disease and get U.S. export markets reopened more quickly.

(With the planned closing of PIADC, USDA's vaccine bank housed at the center currently is being transitioned to a vendor-managed bank. While the new National Bio and Agro-Defense Facility, or NBAF, at Kansas State University is the replacement for PIADC and has the high bio-containment necessary to handle a virus such as FMD, it never was designed or intended for vaccine production and storage – an activity more suited to private industry.)

Establishing a more robust vaccine bank will require a significant increase in budget outlays – \$150 million annually – but the cost pales in comparison to the economic cost of an FMD outbreak in the United States.

Iowa State University economist Dermot Hayes estimates the cumulative impact of an outbreak on the beef and pork industries over a 10-year period would be \$128.23 billion. The annual jobs impact of such a reduction in revenue would be 58,066 in direct employment and 153,876 in total employment. Corn and soybean farmers over a decade would lose \$44 billion and nearly \$25 billion, respectively, making the impact on those four industries alone almost \$200 billion.

A recent study by Kansas State University estimated the cost to the U.S. government of eradicating FMD would be \$11 billion if vaccination is not employed. But costs could be cut significantly if vaccination is used, and, the study estimated – depending on the strategy – losses to consumers and producers could be cut by 48 percent.

Research can help address the alarming gap in the government's preparedness for an FMD outbreak. The U.S. pork industry is requesting that Congress include in the next Farm Bill authority for \$30 million a year for the National Animal Health Laboratory Network, which conducts diagnostics on animal diseases, and \$70 million a year for block grants to the states for disease surveillance and other support.

It should be noted that the U.S. pork industry is working with the beef, dairy and sheep industries in developing a response plan to an FMD outbreak (or any other FAD),

including cross-species and public-private communications and coordination and requests for further research and disease surveillance.

Disease surveillance is the foundation of disease prevention and preparedness. The threat of new and emerging diseases continues to grow, with scientists continually warning the public and animal health authorities about the increasing risks.

In addition to demonstrating the efficacy of research, the 2009 H1N1 influenza outbreak also showed the interrelationship of human and animal health when combating new and emerging diseases and prompted work on a Comprehensive and Integrated Surveillance System (CISS) to ensure that data is captured on a broader range of diseases.

The pork industry has been working with USDA APHIS and the CDC to develop a CISS, including continuation and expansion of ongoing swine influenza surveillance.

Completion of this is critical to maintaining the pork industry's known disease status, which, in turn, is vital to maintaining and expanding U.S. pork exports. The CISS is designed to provide an "early warning system" and to allow for development of response plans before epidemics erupt.

The U.S. pork industry is collaborating with APHIS to test implementation of a CISS and to determine how it can be connected to an animal traceability system. Currently, the most significant shortcoming is funds to build the infrastructure to accommodate a more robust system of surveillance.

The ability to expand and strengthen surveillance to include other diseases will help increase U.S. meat exports. Reducing surveillance, however, would give other countries justification to restrict U.S. exports because of inadequate surveillance data.

Renewed Commitment to Research

As previously mentioned, the U.S. pork industry – indeed, all of U.S. agriculture – remains vulnerable to any number of diseases. Pork producers still are dealing with PRRS

and remain susceptible to a recurrence of PEDV and to an outbreak of several foreign animal diseases, including FMD.

Whether it's FMD, PRRS, PEDV or some other emerging swine disease that attacks the U.S. hog herd, the economic impact on the pork industry and resulting higher food prices for consumers would be crippling. Disruption of the industry's international markets, alone, would jeopardize nearly \$6 billion in export sales.

Unfortunately, the commitment to agricultural research seems to have waned recently. According to USDA's Economic Research Service, public-sector food and agricultural research and development was "relatively stable" at 50 percent from 1970 to 2008 but by 2013 had fallen to less than 30 percent. The Agriculture and Food Research Initiative (AFRI), for example, which was established through the 2008 Farm Bill to provide grants for research, education and extension activities in six priority areas, was authorized for \$700 million in the 2008 bill – and reauthorized in the 2014 Farm Bill – but has not received full funding; it got \$375 million for its most recent fiscal year.

While other federal research and development budgets have grown over time, agricultural research funding has stagnated. Congress automatically adjusts the budget each year for the National Institutes for Health just to keep up with inflation, for example, but USDA ARS has nothing comparable. This has led to a steady erosion of funding available to support research programs. In 1982, USDA's National Animal Disease Center (NADC) in Ames, Iowa, for example, had more than 80 Ph.D.-level scientists; today it has less than 40.

Additionally – and of great concern to the U.S. livestock sector – because it has not been adequately funded, leading to disrepair, no animal research or disease diagnostician training is being conducted at the Plum Island facility, and NBAF won't open until 2022 at the earliest.

One factor contributing to the decline in research output is the increased cost of operating new high bio-containment facilities. When the NADC was constructed it was heralded as the answer to the lack of animal research capacity, with great expectations for new research on animal diseases. New funds, however, never were made available to address the increased cost of operating such a high-tech facility, and funds have been diverted from research projects to keep the facility open. This same concern applies to NBAF. Without increased operating funds following its opening, its full potential never will be realized.

Over and above research dollars, there must be a congressional commitment for operating funds for the new NBAF and other federal agricultural research facility.

The United States is falling behind developing nations in funding agricultural research. China, for example, has tripled government investment in the agricultural sciences – it now outpaces the United States – and food production there has skyrocketed.

There must be a renewed commitment to funding research, education and extension programs by improving the quantity and quality of USDA research through the AFRI. Basic, competitive agricultural research will allow America's farmers to remain globally competitive in the face of a growing world population, improve public health and strengthen national security.

Benefits of Research

The obvious benefits of research on diseases that can affect U.S. agriculture are enhancing the ability to continue producing a safe product and selling that product in domestic and foreign markets.

Research conducted by USDA's NADC on the H1N1 virus, for example, is estimated to have saved pork producers \$470 million in additional losses, and eradication of hog cholera – the United States was declared free of the disease in early 1978, 99 years after USDA began research on it and 17 years after a federal-state eradication campaign was

commenced – was estimated in 2006 to be worth about \$365 million a year. The disease-free status meant U.S. trading partners would take U.S. pork.

But breakthroughs in genomics and nanotechnology also are improving food safety and human health, and scientists are discovering ways to increase production while minimizing the impact on the land and water.

Indeed, mostly because of research and the use of modern technology (developed through research), today 60,000 hog operations produce about 24 billion pounds of pork annually compared with 1960 when about 700,000 produced 12 billion pounds. Through better genetics, better feed rations and new animal care and housing methods, hog farmers now produce more pigs on 78 percent less land, using 41 percent less water than 50 years ago, according to a 2012 study from Camco.

Likewise, there have been tremendous increases in crop yields attained through research on plant breeding, plant nutrition and production practices. Corn and soybean production, for example, has increased by 75 and 47 percent per acre, respectively, since 1950. (Total red meat production has risen by 55 percent.)

The evidence is overwhelming that agricultural research has paid huge dividends to farmers and ranchers. In fact, according to the USDA's Economic Research Service, for every \$1 of federal agricultural research funds invested, \$20 is returned to the economy.

Conclusion

Agricultural research isn't a luxury; it's a necessity. While the U.S. agriculture and food sector comprises just 5.5 percent of the country's GDP, it provides about 85 percent of the food that sustains Americans! (The United States imports almost 15 percent of its food.)

There's also the challenge of feeding a world population that's expected to increase by almost a third over the next three decades. The U.N.'s Food and Agriculture

Organization, in its report “How to Feed the World 2050,” says food production will need to increase by 70 percent and that “80 percent of the necessary production increases would come from increases in yields and cropping intensity and only 20 percent from expansion of arable land.” The majority of that 80 will come from advances in science and through new technologies, both of which will be the result of research.

That, along with growing challenges such as the threat of new diseases, underscores the need for the United States to again be the world leader in agricultural research and technology.

The U.S. pork industry strongly supports, and urges a significant increase in funding for, federal agricultural research to USDA ARS (intramural) and/or through grants to university scientists (extramural) to help America’s pork producers and all of U.S. agriculture continue feeding a growing world with safe, wholesome, nutritious food.