

April 2016

Detect and Defeat

Pat Melgares
Kansas State University

Follow this and additional works at: <https://newprairiepress.org/seek>



Part of the [Higher Education Commons](#)



This work is licensed under a [Creative Commons Attribution-Noncommercial-No Derivative Works 4.0 License](#).

Recommended Citation

Melgares, Pat (2016) "Detect and Defeat," *Seek*: Vol. 6: Iss. 1.

This Article is brought to you for free and open access by New Prairie Press. It has been accepted for inclusion in *Seek* by an authorized administrator of New Prairie Press. For more information, please contact cads@k-state.edu.



DETECT ██████████ AND DEFEAT

By Pat Melgares

Kansas State University researchers take aim at deadly swine diseases

Late in 2015, scientists at Kansas State University and the University of Missouri delivered news that likely had swine producers worldwide rejoicing: The researchers had developed pigs that are resistant to porcine reproductive and respiratory syndrome, the most devastating disease in the industry.

Known as PRRS, the disease has wreaked havoc on swine operations to the tune of \$10 billion over the last 20 years. It is estimated that the disease robs the swine industry of \$600 million each year.

So pardon Raymond “Bob” Rowland if the universities’ discovery seemed surreal. The professor of diagnostic medicine and pathobiology at Kansas State University has studied this disease for more than 20 years, nearly his entire professional career.

“I always thought that it would be a generational problem,” Rowland said. “That is, it wouldn’t be solved by me, but probably by the next generation of scientists.”

Resistant pigs are ‘game changer’

It took Randall Prather, a professor of animal science at the University of Missouri, 10 years to genetically engineer pigs so that they would lack a critical protein that seemed to make the pigs susceptible to PRRS. Staff in

Kansas State University’s Large Animal Research Center challenged the pigs in a research setting with the PRRS virus.

“Our first experiment was with the CD 169 protein, but it turned out that was not the molecule,” Rowland said. “We moved on to CD 163 and we found almost immediately that it not only was the right target, it was black and white. When we saw the data, it was very clear that we had the desired result.”

The scientists may be able to apply the same concepts to other diseases, Rowland said. At Kansas State University’s Biosecurity Research Institute and the Department of Homeland Security’s National Bio and Agro-defense facility, which is under construction adjacent to campus, Rowland sees numerous opportunities to continue research that benefits animal well-being, supports industry and helps meet the global demand for animal protein.

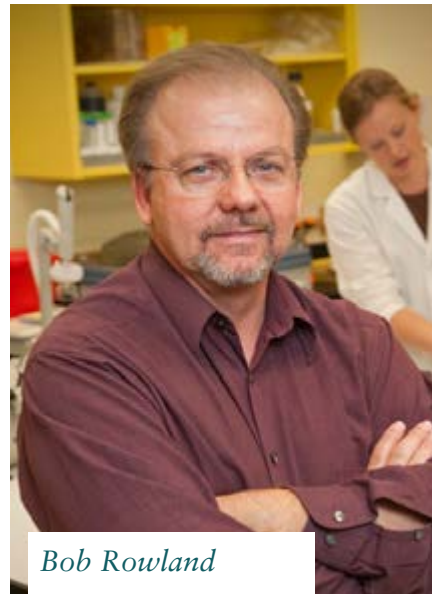
“It’s a unique way of tackling viral disease. It is truly a game changer.”

University relentless in solving PRRS

It shouldn’t come as much of a surprise that Kansas State University researchers were part of the breakthrough on PRRS. In terms of a commitment to research of that disease, “we own PRRS,” said Rowland. “There are a lot of groups in the U.S. doing research in this area, but for

“IT’S A UNIQUE WAY OF TACKLING VIRAL DISEASE. IT IS TRULY A GAME CHANGER.”

Raymond “Bob” Rowland



Bob Rowland



Mike Tokach

Fast facts

A look at two diseases that have been devastating to the swine industry worldwide in recent years

PRRS

Porcine Reproductive and Respiratory Syndrome

PRRS, sometimes called blue-ear pig disease, is a virus that causes reproductive failure in breeding stock and respiratory tract illness in young pigs.

1987: First found in North America and central Europe.

\$600 million: Estimated annual cost of disease to swine industry.

PEDv

Porcine Epidemic Diarrhea Virus

PEDv causes acute diarrhea and dehydration in pigs of all ages. It does not pose a risk to other animal species and is not a threat to the human food supply.

1970s: Virus has been present in Europe since then, but discovered in the U.S. in 2013.

8 million: Estimated pig deaths due to the virus in 2014.

100% mortality rate in piglets under 7 days of age.

the breadth and depth of PRRS research, we are No. 1.”

Rowland said the university has been relentless in addressing PRRS, using its resources in diagnostics, genetics and biotechnology, vaccines, economics, education and outreach, biosecurity, epidemiology and ecology, and disease modeling to help swine producers in the U.S. and worldwide.

For instance, Jianfa Bai, an associate professor in the Kansas State University Veterinary Diagnostic Laboratory, has managed a team that analyzed gene sequences for more than 250 strains of PRRS over the last 10 years.

“It’s very practical research that helps people to make management decisions in the field,” Bai said, noting that the information his team is able to provide also helps scientists with their research.

Ying Fang, an associate professor of molecular virology, develops and tests vaccines against the PRRS virus. She is also working to develop vaccines against other high-risk viruses, such as swine influenza, African swine fever and Senecavirus A.

Fang has studied PRRS since 1998, and is considered one of the world’s top experts on the disease. In 2015, she was named chair of the 2017 International Nidovirus Symposium, which will be in Kansas City.

Rowland, too, is recognized as one of the country’s foremost experts on PRRS. Since 2010, he has been the executive director of the PRRS International Symposium, which draws scientists from around the world to learn the most updated information on the disease.

In 2008, the U.S. Department of Agriculture selected Rowland as project leader of the multistate PRRS coordinated agricultural project. The project was funded for \$4.8 million, and set the stage for some of the early genetics work.

In a state known for beef, pig research thrives

In Kansas, cattle and calves dominate agricultural production. That industry is booming, with an estimated 6 million head and \$8 billion in



cash receipts each year.

But even in that environment, Kansas State University has stamped itself as a leader in the U.S. swine industry.

Recently, a university swine nutrition team announced that they are making steady progress in developing improved diets for pigs, a science so exact that even a 1 percent improvement in feeding efficiency can translate into \$100 million of added profit to the industry.

“Our first goal is to save feed and thus reduce costs for producers, which ultimately reduces the cost of pork to consumers,” said Mike Tokach, university distinguished professor of animal sciences and industry. “The other very important part of our research is the environmental side. Anything we do to improve feed efficiency reduces the output of nitrogen and phosphorus from that farm.”

The \$5 million project is funded through 2017 by the National Institute of Food and Agriculture.

In another project, Kansas State University researchers are hoping to take down a deadly virus that is said to have a 100 percent mortality rate in piglets under 7 days old.

European farmers have dealt with the porcine epidemic diarrhea virus, or PEDv, since the 1970s, but it wasn’t until 2013 that the costly disease was discovered in a U.S. herd. Some estimates indicate that 8 million pigs died due to the virus in 2014.

“We have established that feed and feed ingredients may act as a vehicle to transfer the virus,” said Kansas State University’s Jason Woodworth, an associate professor of animal sciences and industry. “This is extremely important because feed and ingredients are not normally considered a vector in transmitting diseases.”

In the university’s Veterinary Diagnostics Laboratory, Benjamin Hause, an assistant professor, led a research team that identified a new pestivirus that killed pigs in North Carolina. In pigs, the virus is similar to Parkinson’s disease in humans.

In early 2016, Hause’s lab also reported the first formal identification and characterization of porcine parainfluenza virus 1 from U.S. pigs, which had previously only been detected in Asia. This work will help lead to vaccines.

“This virus does not typically cause severe disease, but it’s the kind of disease that causes an infected pig to fall behind,” Hause said. “A pig will get a mild cold, won’t eat as well, wean as fast or take off like its litter mates, so there is likely economic significance with the disease.”

Research benefits people, animals

Rowland said that beyond such major projects as discovering pigs resistant to PRRS, Kansas State University is supporting swine research that is for the common good.

“As researchers, we are free to pursue the problems that we want to pursue, the problems that will do the most good,” he said. “It’s not just studying a virus, it’s a philosophy.”

“To do swine work in a cow state is remarkable,” he said. “Kansas State University has allowed us to do this work, and I think what that reflects is that the university chooses to pursue excellence, regardless of area, as opposed to doing research only in targeted areas.”