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Detect and Defeat

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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 range, 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
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 epidemiology, vaccinology, economics, education and outreach, biosecurity, and more. “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. “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, waste as fast or take off like its litter mates, so it’s not a big deal. But even in that environment, Kansas State University has stumped 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 feed efficiency can translate into $100 million of added profit to the industry.

“Most good,” he said. “It’s not just studying a virus, it’s a problem that we want to pursue, the problems that will do the most good.”

Rowland said that beyond such major projects as discovering pestivirus 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 reading a virus, it’s a philosophy.

“In 2008, the U.S. Department of Agriculture selected Rowland as project leader of the multimillion PRRS coordinated agricultural project. The project was funded for $4.8 million, and set the stage for some of the early projects in the U.S. and worldwide. In early 2016, Hause’s lab also reported the first formal identification and characterization of porcine parainfluenza virus 3 from U.S. pigs, which had previously only been detected in Asia. This work will help lead to vaccines.

“In another project, Kansas State University researchers are hoping to take down a deadly virus that is said to be one of the most contagious in all of animal species and is not pose a risk to other animal species or act as a threat to the human food supply.”

Research benefits people, animals

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 stumped itself as a leader in the U.S. swine industry.

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