Healthy Pigs and Safe Pork

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The University of Guelph / OMAFRA research partnership program has been reorganized. As a result the new research project tend to be larger in scope and involve groups of scientists in multiple disciplines. One of three swine related projects is in the area of pig health and food safety. An important justification for such an approach is that pig disease problems tend to be complex in nature being caused by interactions with more than one disease agent and affected by management, environment, nutrition and genetic factors. Therefore by creating a team of researchers with expertise in all of these different areas it may be possible to make exciting progress on important health issues.

The following are the primary objectives of the research project:

1. Explore interactions among pathogens, endogenous microflora, biosecurity, host animals and environment, both on-farm and in the laboratory, to identify key risk factors or contributing factors that cause increased persistence and disease expression with losses from mortality and reduced performance.
2. Explore a wide range of intervention strategies or methods that would reduce these losses due to disease including vaccination, bacteriophage therapy, genetic and environmental manipulation of the pigs' disease resistance, diet, or environmental conditions.
3. Use health management to reduce use of antibiotics, prevalence of human pathogens in pork products and improve animal welfare.

The original team of researchers includes faculty members of Animal and Poultry Science (Kees deLange, Tina Widowski, and Jim Squires), Food Science (Keith Warriner), Population Medicine (Suzanne Millman, Scott McEwen, Bob Friendship and Cate Dewey), and Pathobiology (Patrick Boerlin, Dongwan Yoo, Jeff Gray, Carlton Gyles, Jan MacInnes, Andrew Brooks, Tony Hayes and Bruce Wilkie). This team is composed of people with expertise in animal husbandry, and on-farm disease investigation, as well as nutrition and behaviour so that a portion of the work will involve field studies. There are also those with expertise in microbiology, immunology and molecular biology who will be working in the lab and involved in controlled animal experiments.

The researchers will study naturally occurring outbreaks of disease in an attempt to quantify risk factors and develop models to explain the clinical outcome. Biological material will be obtained from actual cases of disease outbreaks and examined using molecular techniques and isolates will be used in animal experiments. Controlled studies will be used to create infection models to investigate the interactions between hosts and pathogens as well as between multiple pathogens. It will also allow evaluation of preventative protocols particularly novel approaches such as bacteriophages, herbal extracts and vaccination, and behavioural components of the innate and adaptive immune response. Environmental and genetic regulators of variation in host resistance to infection and disease will also be investigated. Better methods of disease control will be created.. Specific goals include gaining an understanding of at least some of the complex interactions between host, environment and disease agents and using this knowledge to alleviate major losses associated with diseases like Porcine circovirus type 2 associated disease (PCVAD) and porcine reproductive and respiratory syndrome (PRRS). In addition, there will be continuous efforts to identify potential food safety pathogens and work to minimize the risk of zoonotic disease. Preliminary results of this team's work over the past few months includes the identification of gene defects associated with higher rates of sickness and culling, the identification of viruses that infect bacteria (bacteriophages) that are proving to be effective in reducing *Salmonella* and *E. coli* in controlled experimental studies, as well as advances in our understanding of PRRS.
This project is expected to continue for four years and provide a framework for other health and research initiatives sponsored by Ontario Pork and others.