

New research into Post Weaning Multisystemic Wasting Syndrome

March 17 2014, by Robert Crosland



Two pigs with PMWS and a healthy pig of same age.

Research led by the Royal Veterinary College has generated valuable insights into a disease that strikes a large number of animals and costs farmers millions of pounds.

Scientists working to control one of the most damaging pig diseases has demonstrated that its causative [virus](#) infects [immune cells](#), evading detection by the host [immune system](#). This renders the host more susceptible to infections.

The research also shows that once the PCV-2 virus - which can cause Post Weaning Multisystemic Wasting Syndrome (PMWS) - infects [immune system cells](#), different genes within them are switched on and off.

The discovery demonstrates one reason why PMWS is so difficult to control but the BBSRC-funded researchers, working at the RVC, Edinburgh's Roslin Institute, the Animal Health and Veterinary Laboratories Agency and Zoetis Animal Health, hope it may offer new avenues of research to develop better preventative treatments.

PMWS is present in all pig-producing countries and costs UK pig farmers millions of pounds each year in losses. Pigs between five and 12-weeks-old are affected with symptoms including wasting, breathing problems, enlarged lymph nodes and death. Existing vaccines reduce economic and animal losses but do not eliminate the virus.

PMWS is a complex disease and the exact relationship between infection with PCV-2 and the disease state is unclear, making it particularly challenging to control. The research indicates that environmental stress to pigs can trigger symptoms.

RVC Professor of Molecular Immunology Dirk Werling, who led the research, said: "We were puzzled by the fact that the virus seems to affect cells in different ways, and that it can infect immune cells without detection. Once the virus is in cells it is very hard to act against it. This research helps show why PMWS is so hard to combat, but a greater understanding of the PCV-2 virus will offer new opportunities to

develop treatments."

The team infected three types of healthy pig immune cells with a PCV-2 virus strain currently circulating in the UK. They saw that infection took place without apparent detection by the immune system and, once infected, gene expression within the infected immune cells changed significantly. This infection is believed to be a significant step in the establishment of the disease state in pigs.

Within pigs many cell types, including the bone marrow, can harbour the virus without showing any signs, acting as a reservoir. Symptoms only appear once the cells have to deal with other stressors, potentially offering an explanation for the occurrence of clinical signs seen.

More information: Mavrommatis B, Offord V, Patterson R, Watson M, Kanellos T, Steinbach F, Grierson S, Werling D.(2014). "Global Gene Expression Profiling of Myeloid Immune Cell Subsets in Response to In Vitro Challenge with Porcine Circovirus 2b." *PLoS ONE* 9(3): e91081 [DOI: 10.1371/journal.pone.0091081](https://doi.org/10.1371/journal.pone.0091081)

Provided by Royal Veterinary College

Citation: New research into Post Weaning Multisystemic Wasting Syndrome (2014, March 17) retrieved 26 April 2024 from <https://phys.org/news/2014-03-weaning-multisystemic-syndrome.html>

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