The fight against PRRS

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More than 20 years after its emergence, porcine reproductive and respiratory syndrome (PPRS) is still having major impacts on the health and welfare of pigs and causing major economic losses worldwide.

PRRS costs the USA pig industry about $600 million a year – about a third of its infectious disease costs. No one has yet worked out how much PRRS costs Europe, but it will be a similarly substantial figure. Sweden faced its first outbreaks of PRRS in 2007. In Asia, the recent outbreak of 'high fever' disease killed 400,000 of 2,120,000 infected pigs in four months in 10 eastern provinces of China. It has been attributed to new fatal variants in the PRRS virus, is still not under control and it is reported to have spread to Vietnam.

Controlling PRRS is important for the industry, the food chain and the consumer.

The disease particularly affects lung alveolar macrophages; cells in the front line of defence against pathogens. The virus establishes persistent infections by suppressing a pig's immune defence mechanisms. PRRS is characterised by respiratory disorders, abortion in sows and high death rates in piglets, which are born weak and liable to develop respiratory problems. The high mutation rate of the virus probably contributes to its persistence, as well as limiting the efficacy of vaccines.

Veterinarians and researchers in Europe are at the forefront of developing new diagnostic tools and vaccines, dissecting the immune response and characterising the genetic diversity of the virus.

Over the last five years, the Roslin Institute has developed a large collaborative research project, funded by BBSRC's Exploiting Genomics initiative. The project includes the Veterinary Laboratory Agency's cutting-edge expertise in farm animal veterinary virology, world class pig breeding from Genus/PIC and genetics and genomics expertise from the University of Cambridge, The Wellcome Trust Sanger Institute and Roslin Institute.

The findings suggest that among the commercial breeds tested, Landrace alveolar macrophages have a substantially reduced response to PRRS virus replication and/or growth as compared to say, Pietrain breed pigs and this may well be genetically controlled.

However, further research and greater coordination of research activities would inform development of more effective control strategies.

BBSRC is supporting an international workshop to review current PRRS research and to promote new collaborative, transnational and multidisciplinary research. Principal topics for discussion are epidemiosurveillance and transmission, immunopathogenesis, vaccine development and diagnostic toolkits.

In depth genome-wide transcriptional analysis using the Affymetrix platform (24,128 genes monitored) has further revealed crucial clusters of transcripts associated with PRRS virus infection. A large fraction of these transcripts were mapped on computer, using BAC-end sequences, on porcine genome backbone contigs. This revealed for the first time the transcriptional map of the innate immune response in alveolar macrophage of two breeds showing different levels of susceptibility to PRRS virus infection. This indicates signalling pathways likely to operate during PRRS virus infection. This map paves the way for the potential future use of genetic strategies to control PRRS. ■

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