

Breed for increased PRRS resistance in pigs



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Porcine Reproductive and Respiratory Syndrome (PRRS) is the top priority viral disease affecting the pig industries of Europe and North America. It is also the most costly disease to these pig industries, with an estimated cost of €126 per sow per outbreak. The PRRS virus (PRRSv) affects both piglets as growing pigs as reproductive sows, and leads to respiratory problems, late-term abortions, prolonged anoestrus, increases in stillbirths and mummified piglets. Because available vaccines are suboptimal and attempts at elimination or eradication have proven to be non-sustainable, attention is now turning to genetic approaches. There is a large research effort by EADGENE partners along with collaborators in North America to explore selection of more resistant (or tolerant) pigs to assist in disease control.

Selection for PRRS resistance with genetic markers

Whilst phenotypes measured on infected animals demonstrate the potential to breed animals for enhanced resistance, their use is not practical within breeding programmes. Genetic markers are required to select animals for resistance, particularly in situations when the disease is kept at bay. For PRRS, it appears that the promise of marker-based selection is a realistic prospect. Results from the PHGC have revealed strong genetic marker associations with viraemia¹, which are consistent across populations. Roslin and Genus-led research within EADGENE has investigated genetic markers for PRRS in reproductive sows, again finding promising results.

Understand mechanisms to cope with PRRS

Functional studies of the host-PRRSv interactions give insight into mechanisms by which pigs may control infection, underpinning the host genetic studies as well as leading towards other control strategies. Roslin-led research has characterized transcriptomic responses to infection and it has proposed mechanisms of control². This research is ongoing within EADGENE and Europe-wide efforts are facilitated by projects such as PoRRScon (www.porrscon.ugent.be).

Selection for PRRS resistance in practice

Results from this research demonstrate proof-of-principle that selection for enhanced resistance to (or tolerance of) PRRS is feasible and beneficial. Furthermore, genetically increasing PRRS resistance will also assist other disease control strategies and help limit

the spread of the PRRSv. To move from proof-of-principle to practical implementation, field studies are now being performed by EADGENE partners in collaboration with commercial breeding companies and North American research colleagues. In a USDA-funded initiative, genetic markers results from the growing pig challenge studies² are being validated under field conditions, with a major focus on training and education of all stakeholders including researchers, vets and breeders. Complementing this, a Canadian initiative (funded by PigGen Canada, the Canadian Swine Health Board and Genome Canada) is exploring genetic marker results in commercial sow herds affected by PRRS.

Main outcomes

- Genetic marker for PRRS
- Possibility to select for PRRS resistance
- Field tests are running

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