

Variants associated with resilient phenotype in sows infected by PRRS virus

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Summary

Porcine Reproductive and Respiratory Syndrome (PRRS) is one of the most challenging diseases that causes substantial economic losses in the pig industry worldwide. The efficacy of vaccination programs to control PRRS virus is limited by its high virulence and mutation rate. During last years, the genetic component of the host response to PRRS has been evidenced, suggesting selective breeding as an additional measure to control PRRS. Therefore, a key step might be to unravel the genetic background of proxies for the host response to PRRS. Previous research in our group reported that the naïve female piglets' response to attenuated PRRSV vaccine can be used as an indicator of resilience against this virus in subsequent infection during their life. Thus, naïve piglets with no viremia 7 and 21 days after vaccination can be considered as resilient. In contrast, positive pigs at 7 and/or 21 days after vaccination can be considered as susceptible. This phenotyping strategy for resilience against PRRS has been recently validated in four farms for three years where resilient sows showed fewer lost piglets during endemic and epidemic conditions. Therefore, the aim of this study was to investigate the genetic determinism of this proxy for PRRS resilience. A total of 128 sows (66 resilient and 62 susceptible) were whole-genome sequenced, and an association analysis was carried out for the classification of pigs as resilient or susceptible using 7,795,669 variants. A total of 35 variants and eleven genomic regions were found associated at pig chromosomes 1, 4, 10, 13 and 16. These genomic regions harbour promising candidate genes involved in the immune response pathway, such as Fc receptors (*FCRL1*, *FCRL3*, *FCRL4*, and *FCRL5*), CD1 molecules (*CD1A*, *CD1B*, *CD1D*, and *CD1E*), selectins E, L and P (*SELE*, *SELL* and *SELP*) and Eomesodermin gene (*EOMES*).

Many of these genes are expressed in antigen-presenting cells, including macrophages, which is the main replication target of this virus. These initial results will be validated using information from other sows in the phenotyped populations.

Keywords: Disease resilience; GWAS; Pigs; PRRS; WGS.

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