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Genome-wide association and transcriptome studies for immunity traits in French Large White pigs

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Global robustness and disease resistance have emerged as key concepts for a sustainable resilience in animal production systems. Including health criteria in selection schemes is one of the challenging objectives of the current decade. We have launched a project that combines genetics, genomics and functional studies in a cohort of French Large White pigs with the aim to characterize immune response levels as a measure of individual's immunocompetence. A wide range of both innate and adaptive immunity traits are heritable, confirming that many parameters are under genetic control and susceptible of being included in selection protocols. Genome-wide association studies allowed us to detect significant associations for traits that quantify white blood cell subpopulations, specific antibody levels after vaccination, phagocytosis, and cytokines produced by blood cells after *in vitro* stimulation. Transcriptome analyses have revealed differentially expressed genes in peripheral blood of animals with contrasted levels of various parameters (white blood or CD4-CD8+ cell counts, phagocytosis, *in vitro* production of IL2 and IL10). Genetics and genomics data will be integrated to identify biologically relevant candidate genes that underlie the phenotypic variability of the heritable studied immune traits. A next challenge will be to investigate the value of immunocompetence traits to predict resistance of animals facing various pathogens.