RESEARCH ABSTRACT
SWINE HEALTH

Title: "Year 3 funding support for the PRRS Host Genetics Consortium: A proposal to study the role of host genetics and resistance to PRRSV" **– NPB #10-156**

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Scientific Abstract
The PRRS Host Genetics Consortium **(**PHGC) is an international effort developed with input from PRRS researchers, NC1037/NRSP8 genome researchers, members of the NPB Swine Health and Animal Science Committees, veterinarians, AASV, producers, and commercial partners. It was initially funded by NPB starting in December 2007. The PHGC incorporates a nursery pig model to assess pig responses to acute PRRSV infection and to study the relationship between host genes and the resistance/susceptibility of pigs to PRRSV infection. Blood and other samples (e.g. oral fluids) and weight measurements are collected regularly. Serum and Tempus tube blood samples are collected at 10 time points for all pigs, providing the opportunity to create "deep phenotypes" of the anti-PRRS response. Tonsil tissue is collected at the end of the study, on day 42. The presence of virus in tonsil is used as a measure of persistent infection. Phenotypic measurements include virus levels, overall virus load, weight gain, antibody responses (total and neutralizing), gene expression and cytokine protein levels in serum. All samples are catalogued and distributed to appropriate testing labs and stored for use in future studies. The data are collected into a secure PHGC relational database, housed at Iowa State University and maintained by James Reecy. Genomic DNA is prepared from each pig and is genotyped using funding from separate PRRS CAP and Genome Alberta grants and through resources provided by the national NRSP-8 swine genome coordinator. RNA is prepared from Tempus blood tubes for Pigoligoarray hybridization studies and total RNA sequence (RNAseq) analysis of host gene expression, which is supported by a separate USDA NIFA grant and recent Genome Canada and Genome Alberta grant funding. Oral fluid samples are collected for the purpose of developing improved PRRS surveillance methods. To date, PHGC activities have produced several important discoveries, including markers on chromosome 1, 4, 7, 17 and X, which are involved in disease resistance and immunity.

Deliverables of the PHGC include:

- Development of genetic and blood tests that can be used to predict how pigs respond to PRRSV infection.
- Determination of alleles in genomic regions, single nucleotide polymorphism (SNP), or candidate genes [and source pig genetics] which are correlated with the response of pigs to PRRSV infection.
- Identification of quantitative trait loci (QTL) to develop selection procedures to lower the effects of PRRS and prevent persistence of PRRSV virus in pigs.
- Discovery of unique PRRSV resistance mechanisms and virus-host interactions.
- Characterizing of innate and adaptive responses that lead to protective versus pathologic anti-PRRS responses.
- Development of sample and data resources for use by the PRRS research community.