RESEARCH**ABSTRACT**

SWINE HEALTH

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Title: Project Cross-Neutralizing Antibodies as Predictors of Protection - **NPB #14-213**

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Scientific Abstract:

Vaccine control and prevention of porcine reproductive and respiratory syndrome virus (PRRSV) is difficult to achieve. Neutralizing antibodies, which are useful predictors of immunity against many viral infections, have an uncertain role against PRRSV. Presence of neutralizing antibodies was shown to predict protection only for re-exposure to the same virus. But, since PRRSV is enormously diverse, immunity needs to be cross-protective. In this project, we showed widespread presence of high titers of antibodies with broad cross-neutralizing activity against PRRSV in sow herds. Passive administration of purified immunoglobulins with neutralizing antibodies reduced PRRSV2 infection by up to 96%, and PRRSV1 infection by up to 87%. The amount of protection was proportional to the level of neutralizing activity transferred. The immune competence of passive immunoglobulin transfer was associated specifically with antibody neutralizing activity since PRRSV-immune serum lacking neutralizing activity was not protective. Herd-level prediction of protection in the field based on broadly neutralizing activity in serum was confounded by high variability among animals in the quality and characteristics of the neutralizing activity. Alternative approaches to predict protection by assessing immune memory were investigated by development of fluorescently labeled PRRSV virions and a PRRSV-specific memory B cell tetramer. Memory B cells are an immunological basis by which vaccines work. The B cell reagent is designed to identify memory B cells that would respond to PRRSV infection by producing protective antibodies. Production of the tetramer will facilitate studies to assess its potential for predicting the protection status of pigs in a blood sample without a need for challenge studies. The results show that immunological approaches aimed at induction of broadly neutralizing antibodies may substantially enhance immune protection against PRRSV. The findings further show that naturally occurring viral isolates are able to induce protective humoral immunity against unrelated PRRSV challenge, thus removing a major conceptual barrier to vaccine development.