RESEARCH ABSTRACT

SWINE HEALTH

Title: Expanding the immune toolkit for assessing pig health and improving swine disease and vaccine studies - **NPB 05-015**

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[with major collaboration with Dr. Serge Muyldermans, Free Univ. Brussels, Belgium]

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Abstract:

Swine disease and vaccine research has been advanced by the development of sophisticated tools to measure physiologic parameters associated with immunity, pathology, and disease prevention. Our goal is to expand the immune toolkit for pigs, by developing and characterizing reagents that can be used to identify and quantify a major class of immune proteins, the antibodies or immunoglobulins (Igs). Swine produce antibodies, or Igs, in response to infection or vaccination. Scientists measure pathogen exposure and vaccine efficacy by quantitating Ig levels in serum. But not all Igs are equal. We know for porcine reproductive and respiratory syndrome virus (PRRSV) infections that there is a well-characterized antibody response as measured by the IDEXX ELISA. However, the more relevant test is whether infected or vaccinated pigs produce neutralizing Igs against the virus. These Igs may be a specific class of IgG. Neutralizing Igs are known to take longer to develop but are important in recovery from PRRSV infection.

The goal of this grant is to develop a broader panel of anti-swine Ig reagents to verify exactly which Ig classes, in particular IgG subclasses, are critical. Reseachers require such reagents to determine Ig function; diagnostic laboratories use them to measure Ig levels. Currently most investigators rely on polyclonal antisera that are tedious to prepare, lack immortality, are usually not class specific, and vary between batches. For NPB project #05-015 we started the process of characterizing and developing new monoclonal antibody (mAb) reagents that uniquely recognize the various Ig isotypes and IgG subclasses.

To accomplish our goals we expressed the previously known five swine IgG genes as cDNAs and actually discovered numerous other IgG genes, which are still in process of analyses. We worked with a collaborator, Dr. Serge Muyldermans, in Belgium to express the 5 previously known swine IgG subclass proteins in vitro using his novel camelid-swine Ig expression system that efficiently produces single chain porcine-camelid chimeric IgGs. With this camelid system we have the means to express only constant regions of the specific swine IgG heavy chain proteins to produce and characterize mAb.

For our second objective, we characterized the reactivity of the currently available mAb anti-swine Ig. We assured that Canadian anti-swine IgA and IgM hybridomas and mAb are available at the USDA APHIS NVSL lab in Ames, IA and that anti-IgG hybridomas were imported from the UK . Our overall goal is to have a full panel of well-characterized mAb that react specifically with each swine Ig isotype and IgG subclass so scientists will be able to compare accurately the functions of each swine Ig isotype and subclass. This will hopefully expand our understanding of disease control mechanisms and pathologies, as well as serve as improved tools for characterizing swine vaccine responses.