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The Comparison of the Immune Response of Designated Pathogen Free Research Pigs To Specific Pathogen Free Pigs When Exposed to Antigen

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Spring Point Project's Source Animal Facility (SAF) was constructed in 2006-2007 in order to provide a suitable site for the generation of designated pathogen free (DPF) pigs that could eventually yield organs, tissues or cell preparations for xenotransplantation into humans. DPF status was demonstrated with 33 necropsies, that swine had not been exposed to 24 strains of bacteria, three species of fungi, three groups of parasites, arthropods and 20 viruses for at least two generations. It's been shown that DPF swine have significantly lower white blood cell values as compared to vaccinated, non-barrier raised swine of similar genetics. Circulating numbers of lymphocytes in DPF swine are also lower than those reported in standard reference tables. Low lymphocyte numbers have additionally been observed in a) high health qualified pathogen free pigs reared initially under gnotobiotic conditions followed by housing in a "bioexclusion facility". While lower complete blood count (CBC) baseline values for white blood cell count, % white blood cells and absolute number of white blood cells are indicative of immune system naiveté, the response to lymphocyte proliferation assay or antibody response has not been characterized. The goal of this study is to compare and contrast immune system function, including the response to antigen challenge, between non-vaccinated designated pathogen free (DPF) pigs housed in a biosecure barrier facility and commercially available non-vaccinated specific pathogen free (SPF) high health swine, which are negative the seven most common swine pathogens.

Materials and Methods

A baseline CBC values for white blood cell count, absolute number of lymphocytes and % lymphocytes was obtained from two groups of swine: designated pathogen free animals in SPP's Source Animal Facility (DPF) and SPF animals from Midwest Research Swine nursery unit (CONTROL). Blood samples were obtained

by jugular venapuncture and sent to Marshfield Labs (Marshfield, WI) for CBC analysis. Six pig were chosen at random from each group and vaccinated with RespirSure, a Mycoplasma hyopneumoniae -killed vaccine, administered twice intramuscularly in a two week interval according to manufacturer label. Serum and whole blood samples were taken prior to vaccination to ensure naiveté of animals and then every five-seven days for 7 weeks to measure the antibody response. Lymphocytes were purified from samples taken on day 0, 21, and 42 of the study to assess in-vitro cellular immune response and proliferation via flow cytometry

Results

Significant differences ($P < 0.0001$, $P < 0.003$ and $P < 0.0001$ respectively) were seen in circulating total white cell count, the % lymphocytes and total lymphocyte. The antibody data also show both significant differences not only with the groups but also between the groups. Table 1.

Even though designated pathogens free pigs by definition are immunosuppressed we can see here that these animals are still able to respond to antigen and respond more robustly than specific pathogen free pigs raised in conventional housing.