RESEARCH ABSTRACT

SWINE HEALTH

Title: Evaluating the effect of natural planned exposure on gilt immunity and passive immunity in their piglets via genotype specific rotavirus A and C ELISA - **NPB #18-127**

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*Please note that while the contract was transferred to Dr. Pogranichniy upon the departure of Dr. Doug Marthaler from Kansas State University, all technical work was directed and supervised by Dr. Waithaka Mwangi and Dr. Marthaler, the advisors of the Graduate Research Assistant who performed the work, Deepak Kumar. Please direct all questions to Dr. Mwangi (wmwangi@vet.k-state.edu) and Deepak Kumar (dkumar@ksu.edu).

Scientific Abstract:
Rotaviruses (RVs) cause severe diarrhea in young animals including pigs and humans. Swine RV infections cause severe economic losses for producers because infections can be symptomatic or asymptomatic in pigs, and estimating the true economic loss due to RV infection is difficult to measure. RVA strains have been considered the most pathogenic and epidemiologically diverse of all RV groups infecting all animals including swine. RVC is difficult to propagate in cell culture, lacks a proper serological typing test, and no commercial RVC vaccine is available. Recently, multiple studies have identified RVA and RVC infections as important causes of diarrhea in swine. Historically in the United States, RVA infections were considered the more prevalent. However, recent studies indicate RVA and RVC infections are more common in piglets <21 days of age. Some RVA and most, if not all, RVC strains are extremely difficult to adapt to cell culture, and serological assays are unavailable to measurement of the immune response and antibody levels in response to natural planned exposure (NPE) protocols. The VP7 (G genotypes) is the most immunogenic, highly glycosylated, independently elicit neutralizing antibodies, and induce protective immunity. Multiple different genotypes/serotypes exist, and the neutralizing antibodies are serotype specific and provide minimal or no protection against viral infections from different serotype. In serum and colostrum, the primary antibody is IgG, which is transferred from the serum to colostrum during gestation and absorbed into the piglet's serum upon ingestion of colostrum. The primary antibody in the intestine is IgA, which is transferred to piglets during ingestion of milk and protects against enteric infections. The consistent intake of IgA via milk protects the piglets from viral infection. Project objectives 1) Develop an ELISA tests to measure neutralization of G specific surface glycoprotein against rotavirus A and C in sera, milk, and colostrum from rotavirus A and C-infected gilts

2) Investigate the neutralizing Ab response to rotavirus A and C in gilts after feedback and passive immunity in their piglets Expi293 mammalian expression system was used successfully to express rotavirus A G5 and rotavirus C G6 VP7 proteins. Two ELISAs were standardized for rotavirus A G5 and rotavirus C G6. Results suggest that three doses of NPE resulted in highest serum IgG titers in gilts at farrowing. Piglets born to gilts receiving 3 doses of NPE resulted in highest serum rotavirus A IgG titers at birth until weaning, which clearly indicates that 3 doses of NPE provide better protection against RVA infection in piglets. For RVC, three doses of NPE resulted in highest RVC IgG and IgA titers in sow colostrum and milk. Most importantly, Interestingly, piglet serum RVC IgG levels were significantly low compared to serum RVA IgG titers at birth, which possibly explains the high prevalence of RVC in neonatal piglets. In particular, all three treatment groups showed low RVC titers compared to RVA titers. This project describes the antibody levels in sows and their piglets after receiving natural planned exposure. Clear differences were observed in antibody levels among study groups against rotavirus A. However, rotavirus C antibody levels were not significantly different among different treatment groups. In particular, piglet serum RVC IgG and IgA levels were not very different among different treatment groups, which could be due to the high RVC ct values of the original NPE material administered to the gilts. In comparison, RVA ct values of the NPE materials were significantly less. However, results if this project expands our understating of the NPE protocols used in swine farms and will assist producers to make better decision in terms of timing and dose of the NPE.