RESEARCH ABSTRACT
SWINE HEALTH

Title: Effects of Exposure to Organic Dust on Macrophage Function: Implications for Swine Respiratory Health – **NPB #11-064**

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Date Submitted: March 21, 2013

Scientific Abstract

Respiratory diseases are responsible for a significant amount of animal morbidity and mortality in the swine industry, including the majority of nursery deaths and grower/finisher deaths. Innate immunity and the maintenance of lung macrophage health and function is an important defense mechanism against respiratory pathogens and their associated losses. Chronic exposure of swine industry workers to airborne barn dust results in significant predisposition to airway diseases, yet few studies have examined the impact of dust on the swine immune system. We evaluated cytokine production, cell surface marker expression, and the phagocytic, antibacterial and nuclear translocation capacities of porcine macrophages after in vitro exposure to an organic swine barn dust extract (ODE). To our knowledge, this is the first study to demonstrate the effects of swine barn dust components on pig macrophage activation and function.

Exposure to ODE induced AM secretion of both pro- and anti-inflammatory cytokines, suggesting a complex activation profile. Additionally, ODE induced expression of genes involved in sensing Gram-positive bacteria, a major component of barn dust. ODE also enhanced the expression of several cell surface markers of activation, including a receptor for porcine reproductive and respiratory syndrome virus (PRRSv). Moreover, two of the primary functions of AM, phagocytosis and bacterial killing, were impaired after exposure to ODE. Treatment with ODE for the first 72 h of differentiation also inhibited the ability of monocyte-derived macrophages (MDMs) to translocate NF-κB to the nucleus after stimulation. Taken together, these results indicate that dust exposure negatively affects pig macrophage function and alters immune phenotype, potentially enhancing host susceptibility to a variety of respiratory infections.