

(L-R) Prithy Babu, Post-doctoral Fellow, Julie Schmied, Graduate Student, and Dr. Bruce Wilkie

Enhancing immune response as a way to fight disease

by KATE PROCTER

Rather than fighting each new disease as it comes along, researchers are focusing on treatments that will improve immunity in newborn pigs, using susceptibility to allergies as a guide

Overcoming the diseases associated with raising pigs has been a battle producers have fought for decades. To help in this fight, Dr. Bruce Wilkie and his team at the Department of Pathobiology, Ontario Veterinary College University of Guelph are researching new approaches to disease and immunity which focus on animals' general ability to resist diseases rather than on individual diseases.

Wilkie, working with post-doctoral fellow Prithy Babu and graduate student Julie Schmied, is currently investigating ways to make individual animals more able to resist a variety of diseases by enhancing their ability to make properly balanced immune responses at an earlier age.

Focusing on individual diseases "puts us on a bit of a treadmill," says Wilkie. As soon as one disease challenge is overcome, a new one looms. Pigs need to be able to adapt to an ever-changing threat of infectious disease. Wilkie suspected that resistance to a variety of different diseases could be achieved by enhancing immune response. The researchers started studying this problem when they considered that there was often very dramatic variation in immune response within and between litters and individual pigs.

Historically, studying genetic effects on immune response has confirmed that some 75 per cent of variation is due to environmental influences, which has led researchers to focus their investigation on treatments which might enhance the immune response.

Wilkie says they were particularly interested to learn about new-born pigs and even pigs in utero, since at this time the developing immune system deals with the need to maintain pregnancy, a very different problem than resisting infection and allergy after pigs are born. He and his team, therefore, considered possible influences on immune response development and how these affect a pig's ability to mount immune response as it ages.

Research in other species had shown that abnormal neonatal exposure to common bacteria in the intestine delayed adaptation of the immune system to the extrauterine environment. One manifestation of this is development of allergies. Wilkie suspected that similar variables could occur in pigs leading to predisposition to allergies and certain infectious diseases. Treatments intended to simulate the positive developmental effects of bacteria on the immune system were tested, using susceptibility to allergy as the indicator of treatment effects.

By injecting the piglets with killed bacteria within the first seven days of life, they were very successful in reducing susceptibility to allergies. The development of allergies provides a model of immune response function within an individual, Wilkie explained. Declining susceptibility to allergy is likely related to increased ability of the immune system to control some infectious diseases. "We were not looking at specific infections but at immune response function generally, a trait that underlies general ability to remain healthy," he says.

The research is now seeking to identify defined molecular bacterial components in order to determine if these might enhance immune response in neonatal pigs. Wilkie hopes that this will improve health overall and provide resistance to a variety of diseases.

This research was funded by The Natural Sciences and Engineering Research Council of Canada (NSERC), The Ontario Ministry of Agriculture Food and Rural Affairs (OMAFRA) and Ontario Pork.