

Research on mice may help post-weaning in pigs



*(L-R) Dr. Kees de Lange
and Dr. Julang Li*

by MIKE MULHERN

to defeat problems

Genetically engineered lactic acid, delivered directly to the stomach of mice, has been shown to result in weight gain. The hope is that a similar approach may work with pigs

A process that has proven effective in mice may one day be used to solve post-weaning problems in pigs, such as diarrhea and reduced growth rates.

University of Guelph Prof. Julang Li, in collaboration with Prof. Kees de Lange, has had positive results by delivering epidermal growth factor (EGF), using food-grade bacteria, to the intestines of early weaned mice.

The bacterium, *Lactococcus lactis*, was genetically engineered to release EGF in the intestine of the mice. Mice receiving EGF expressing *Lactococcus lactis* gained significantly more weight as compared to control mice. Li, who works in the university's Department of Animal and Poultry Sciences, says that *Lactococcus lactis* was chosen because it is a "nonpathogenic, noninvasive, non-colonizing, Gram-positive bacterium mainly used to produce fermented foods." She adds that lactic acid bacteria are generally regarded as safe organisms and therefore widely used in the production and preservation of fermented products by the food industry.

Sow milk contains EGF and the loss of milk-borne EGF, Li believes, may influence the "development and healthiness of gastrointestinal mucosa of early-weaned pigs." She notes that the change in food composition leads to damaged mucosa and a decrease in digestion and absorption. As a result, piglets become more susceptible to infection and diarrhea.

Pig EGF was used on the early-weaned mice. The EGF expressing *Lactobacillus lactis* was delivered directly into the stomach using a tube. "In the real application," Li says, "it shouldn't have to be delivered in the tube, but we just wanted to make sure it got into the stomach at this experimental stage."

Cautioning that any commercial application for pigs could be years away, Li says that EGF could be delivered as a supplement or in liquid feed if it proves effective in pigs. But, she warns, "we don't know whether it will work in pigs yet, which is why we need to do the next stage, research in a pig model."

One of the issues they will need to overcome in the next research cycle using pigs, Li says, is the need to refine the genetic engineering of the bacteria. After that, government approval will be required before the genetically modified material can be used commercially.

The research on mice, conducted in 2008, was funded by grants from Agriculture Canada, Ontario Pork and the Natural Sciences and Engineering Research Council of Canada. Research with pigs is beginning shortly.

researcherprofile



MARTIN SCHWALBE

Julang Li

by MIKE MULHERN

Julang Li's academic journey, beginning in 1983 when she finished her training in veterinary medicine from Foshan Veterinary College in China, has been long and rewarding.

Currently an associate professor in the animal and poultry sciences department at the University of Guelph, Li completed her Master's degree in neurophysiology at Changchun Veterinary College, China, in 1987. The following year, she returned to Foshan Veterinary College to work as a lecturer and veterinarian. In 1993, she came to Canada as a visiting scholar at the University of Ottawa, where she completed her PhD in cellular and molecular medicine in 1997.

Her work at the University of Guelph began with a postdoctoral fellowship from 1997 to 2000, when she was named an assistant professor. She took up her current position in 2006.

Li has published scores of scientific papers and reviewed scientific articles for *Biotechnology and Biological Science*, the *Canadian Journal of Animal Science*, *Biology of Reproduction*, the *Journal of Molecular Endocrinology*, and *Stem Cell and Development*, among others. Awards have included the Medical Research Council of Canada Fellowship (1998-2000), the Premier's Research Excellence Award (2004-2009) and the University of Guelph President's Distinguished Professor Award (2006-2007).

Li looks forward to continuing her academic research on the benefits of epidermal growth factors in the post-weaning period and applying that research to pork production.