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Grad student wins veterinary training grant to model economics of epidemics



Where economics and epidemiology collide, graduate student Rebecca Smith, DVM '05 builds the tools to chart their course. In March 2011 Smith won a specialized veterinary training grant from the National Institutes of Health (NIH), making her the first student in eight years to win at Cornell University's College of Veterinary Medicine. Smith will use the \$350,000 five-year fellowship to model key cattle diseases and find cost-effective ways of limiting their spread.

As animal models grow increasingly valuable to biomedical research, so do veterinary investigators with animal expertise. The Special Emphasis Research Career Award (K01 Award) in Pathology and Comparative Medicine is the sole NIH grant available to researchers with DVM degrees. Its funds train veterinarians in advanced research techniques while aggressively moving them toward roles as independent investigators.

Smith won through a combination of prior publications, a multidisciplinary mentorship committee, and a research proposal relevant to both animal and human health.

"While many researchers use mouse gene lines to study how human diseases develop in individuals, animal herds can model how diseases spread across human populations," said Smith. "I study mycobacterial diseases like leprosy, tuberculosis, and Johne's Disease, which can devastate animals and humans alike. They're hard to manage and diagnose because symptoms usually arise long after infection begins. But if we can successfully diagnose some cases, we can look back and say when infection probably began, how infectious individuals are likely to be now, and how much a herd is at risk."

With data from dairy herds across the world that suffered outbreaks of bovine tuberculosis and Johne's disease, Smith will apply advanced statistical techniques in new ways to develop a mathematical model. This framework will estimate transmission rates, measure infection pressure, and evaluate control efforts. It will then generate cost-benefit analyses that will help health organizations decide how to most cost-effectively manage disease.

"A third of the world's population is infected with tuberculosis, according to estimates from the World Health Organization," said Smith. "Meanwhile, leprosy is almost gone. In an ideal world we might eradicate all diseases entirely,

but when economics come into play that's not always the best option. We must live with a certain level of disease. This model will help us determine how much.”

Smith will work under the mentorship of Dr. Yrjo Grohn, chair of the Department of Population Medicine and Diagnostic Sciences, and Dr. Ynte Schukken, director of the Quality Milk Production Service and Professor in the Department of Population Medicine and Diagnostic Sciences. A committee from across Cornell will provide further mentorship, including Dr. Robert Strawderman, professor of Biological Statistics and Computational Biology; Dr. Loren Tauer, chair of the Dyson School of Applied Economics and Management; and Dr. David Russell, chair of the Department of Microbiology and Immunology.

Smith teaches the graduate-level course “Introduction to Epidemiology” while pursuing her current research and outreach work.