

MESSAGE FROM THE GRAYSON-JOCKEY CLUB RESEARCH FOUNDATION

DOES MAGNITUDE OF AIRBORNE EXPOSURE PREDICT DISEASE DEVELOPMENT



Grayson-Jockey Club
Research Foundation

This Q&A discusses one of five research projects on *Rhodococcus equi* funded by Grayson-Jockey Club Research Foundation and conducted by Dr. Noah Cohen in recent years. Cohen is a professor and associate department head at Texas A&M University.

Pneumonia is a leading cause of death among foals, and the most common form of foal pneumonia is caused by *R. equi*. Dr. Cohen's most recent ongoing work on foal pneumonia is seeking a vaccine.

Q: What first sparked your curiosity to explore this area of equine research?

There were many sparks. First, Dr. Ronald Martens included me in his *Rhodococcus equi* research program. His passion for solving this problematic disease was inspirational and motivational. Second, I've always been a fan of puzzles, and trying to elucidate the complex relationships involving the bacterial organism, the environment in which both the bacterial and mammalian (foal) organisms live, and the mammalian host (foal) is quite a tough nut to crack. Third, Dr. Gary Muscatello and his colleagues from Australia did pioneering work on quantifying airborne *R. equi* in horse environments. Their good work was clearly the most proximate spark.

Have you studied this area of equine research before?

We have been studying the epidemiology of *R. equi* for some time. From the standpoint of the environment, we had been looking at concentrations of *R. equi* in feces and soil (as well as management practices), but the work from Muscatello and his colleagues made it clear that studying airborne concentrations was important.

What was the most significant finding from this research?

Muscatello and colleagues were first to demonstrate that airborne—but not soil—concentrations of *R. equi* were positively associated with the cumulative incidence of equine pneumonia at Thoroughbred farms in Australia: There were higher concentrations of *R. equi* in the air at farms that had

higher incidence of disease. But it wasn't clear from that seminal work whether the higher concentrations were a cause of disease (i.e., more *R. equi* in air caused more foals to get sick) or an effect of disease (more sick foals were putting out more *R. equi* into their environment). We also had no information about air concentrations of *R. equi* from farms in North America. The principal significance of our work is that we were able to show that airborne concentrations were higher in stalls of foals that went on to get *R. equi* pneumonia than in stalls of foals that did not get pneumonia. Because the higher concentrations were detected before disease, this indicates a causal relationship (because causes must precede effects). This was important evidence of the role of environment in the disease, and indicated that reducing airborne concentrations could help prevent the disease in foals, particularly in foaling stalls.

Another important finding was that concentrations of *R. equi* in the air were higher at times during the day when there was greatest activity (human or horse) in barns. This suggested that perhaps mucking out, etc. should be done when mares and foals are out of the barn so as to reduce exposure to higher concentrations of *R. equi* in the air.

What, if anything, surprised you about your findings?

We also compared concentrations between barns and paddocks/pastures and among locations in barns. I expected the airborne concentrations in the "better ventilated" stalls near entryways and

more peripheral would have lower concentrations. But this wasn't the case. Dr. Ed Robinson suggested to me that greater exposure to winds might make those stalls have more particulates in the air on which *R. equi* would be borne. I thought that was a pretty good explanation.

What did you learn about the research process through your project?

The challenges of collecting samples in Kentucky and sending them to Texas, the challenges of working with many farms, the willingness of farm managers in Central Kentucky to help with sample collection, the importance of having outstanding collaborators when research is being done in different states. In particular, Drs. Jackie Smith and Craig Carter from the University of Kentucky's veterinary diagnostic laboratory made this work possible.

How will this research improve equine health and welfare?

It will only help if it is built upon. We need to try to see whether approaches to reducing airborne concentrations of *R. equi* might be effective at reducing the incidence of disease. There is no reason to expect that this will be completely effective. But it might help. We have some ideas but haven't had the opportunity to investigate.

Has this research led to additional projects?

It has been difficult to obtain funding for the follow-up studies that need to be done. Because funding for equine research is limited, we often have success but can't follow up because there are so many competing problems and so many talented people working on other problems. The continuum grants from the Grayson-Jockey Club are an innovation in equine funding that will help, particularly if more can be offered and more foundations adopt the concept. **BH**