Investigation of Coronavirus as the Cause of Alpaca Respiratory Syndrome

BY SUSAN FORMAN

With funding provided by the Alpaca Research Foundation, virologist Beate Crossley, DVM, PhD, MPVM, of the California Animal Health and Food Safety Laboratory, University of California, Davis; veterinarian Julie E. Dechant, DVM, MS, DACVS, of the School of Veterinary Medicine, University of California, Davis; and Scott A. Callison, BS, MS, PhD Medical Microbiology, owner of Gt Callison, LLC, Mocksville, NC, are working to develop a specific and sensitive test that will aid in the diagnosis of Alpaca Respiratory Syndrome (ARS).

In 2007, beginning in the summer and extending into the fall and winter, many alpacas became ill, showing symptoms of runny noses and coughing. Some were noted to have fevers and more severe respiratory symptoms. As breeders began discussing these symptoms, what appeared to be a viral "cold" type of disease became known throughout the alpaca community as "the snots." As further information became available and more sharing among breeders occurred, it became evident that "the snots" was not something to be taken lightly—some animals were dying. The veterinary community became involved and the illness was re-named Alpaca Respiratory Syndrome, or ARS.

The illness seemed to strike animals on both the East and West coasts. It also appeared that show attendance and the transport of animals played a role in the spread of the disease, although some alpacas from closed herds with no outside contact also became ill. Further, as stated by Dr. Crossley, "anecdotal reports from veterinarians and owners indicated the potential for the dams with respiratory infection in one year to abort in a subsequent year." The alpaca community wanted and needed answers about what was making their animals sick and in some cases resulting in abortions and even death.

In California, a necropsy was performed on an alpaca that had succumbed to the disease and a section of lung was removed for study. The lung section was submitted to the California Animal Health and Food Safety Laboratory (CAHFS) where a coronavirus (CoV) was isolated by Dr. Crossley and her colleagues and identified through genetic sequencing. Testing of blood samples obtained from 32 alpacas in six additional states with known exposure to ARS confirmed the presence of antibodies to the same coronavirus that had been isolated from the lung of the alpaca that had died of ARS. This finding indicated a strong association between ARS and CoV.

Dr. Crossley said, "CoV's have been found routinely in humans and livestock animals such as bovine, porcine, and equine species, most of them associated with enteric disease such as diarrhea. However in some instances, respiratory symptoms or even neurological symptoms are known to be caused by CoV's."

Significantly, comparison of the genetic sequence of the CoV isolated from the lung of the alpaca with ARS to other CoV's isolated from a variety of species and to the CoV that causes enteric disease in alpacas, demonstrated that the alpaca CoV associated with ARS was unique.

Once the virus had been isolated, Dr. Crossley and her associates began studying the development of a rapid, sensitive and specific PCR test for ARS, based on its unique genetic sequence. Studies of the prevalence of the disease will also be initiated, using 150 nasal swabs taken from alpacas presenting with respiratory symptoms at the Veterinary Medical Teaching Hospital at U.C. Davis. Confidential information will be obtained from owners as to age, gender, pregnancy status and travel history.

Imagine the value of this study to the average alpaca breeder. As Dr. Crossley explained, "It is much more efficient to prevent virus spread than to treat or lose valuable animals. With further understanding and diagnostic tests, simple management changes might be used to prevent disease, or the industry might focus future efforts on the development of a vaccine."

As a result of the work of Dr. Crossley and her associates, there is now a real-time PCR assay to test for the presence of Alpaca Coronavirus. Dr. Crossley is currently screening for the virus, but has not seen any new cases. In regards to the return of ARS, Dr. Crossley said, "Viruses in general don't disappear. They

Photo courtesy of the author

Virologist Beate Crossley, DVM, PhD, MPVM of the California Animal Health and Food Safety Laboratory, University of California, Davis, heads the team working to develop a specific test to diagnose Alpaca Respiratory Syndrome (ARS).

might 'hide' somewhere and wait for another chance. Sometimes they adapt to be better prepared for the next opportunity. I am excited that with this test, we may help prevent another outbreak."

Should any alpaca owner wish to have a PCR test done to detect the Alpaca Coronavirus, Dr. Crossley's lab at U.C. Davis will accept either EDTA blood tubes (purple top) or nasal swabs (collected into a sterile tube such as an empty red top tube) and shipped overnight on ice. Based on the current information, nasal swabs would be the preferred sample type for test accuracy. The submission form can be obtained from the California Animal Health and Food Safety Laboratory web page, and samples should be shipped to the U.C. Davis facility. Testing fees will soon be available on the CAHFS website, www.cahfs.ucdavis.edu/lab_tests/index.cfm

The Alpaca Research Foundation wishes to thank Dr. Crossley and her associate investigators for the work that they are doing to help combat ARS and, hopefully, prevent a future outbreak.

Researchers

Dr. Beate Crossley earned her DVM and Dr. med. vet. at the Free University of Berlin, Germany and later, her MPVM at the University of California, Davis. She is currently an Assistant Professor of Clinical Diagnostic Virology at the California Animal Health and Food Safety Laboratory, University of California, Davis. Dr. Crossley is happily married and has two daughters, aged 14 and 11. She and her family live on a small ranch with beef cattle, horses, dogs and cats. She truly enjoys and appreciates alpaca owners and recognizes the deep connection they share with their alpacas, as well as the industry's commitment to continued research. In addition, Dr. Crossley is very interested in the specific viruses that may be unique to alpacas, as well as those shared with other livestock species.

Dr. Julie Dechant attended the University of Saskatchewan where she received her DVM. She then attended the Colorado State University where she completed a Masters degree and a Large Animal Surgery residency and became board certified in the American College of Veterinary Surgeons. Dr. Dechant has been on the faculty at the University of Saskatchewan, the University of Oklahoma and currently, the University of California, Davis. She is also the faculty advisor to the Camelid Medicine Club, supervisor of the camelid blood donor and teaching herd, and is involved in the annual planning of the U.C. Davis Camelid Medicine Symposium. Dr. Dechant is happily married to an animal scientist who specializes in animal breeding and genetics.

Dr. Scott Callison holds a PhD in Medical Microbiology from the University of Georgia. He has worked on numerous projects including avian flu and Coronaviruses that infect poultry.

Author

Susan Forman is the owner of Dewey Morning Alpacas in Washington Court House, Ohio. She currently owns 14 alpacas and two Great Pyrenees who dutifully watch over her small herd. She can be reached at susan@deweymorningalpacas.com.