

Questions and Answers: Results of Study on SARS-CoV-2 in White-Tailed Deer

The U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS) recently completed a study that analyzed serum samples from free-ranging white-tailed deer for SARS-CoV-2 antibodies. Results of the study indicate that certain white-tailed deer populations in Illinois, Michigan, New York, and Pennsylvania were exposed to SARS-CoV-2.

Why did APHIS decide to do this study?

APHIS supports a One Health approach to address animal diseases, including SARS-CoV-2. White-tailed deer are susceptible to SARS-CoV-2, are abundant in the United States (approximately 30 million*), and often come into close contact with people. Given these factors, we felt it prudent to further investigate SARS-CoV-2 in wild deer. Studying the susceptibility of certain mammals, such as deer, to the SARS-CoV-2 virus helps to identify species that may serve as reservoirs or hosts for the virus. It also helps us understand the origin of the virus and predict its impacts on wildlife and the risks of cross-species transmission.

What were the results?

Antibodies to SARS-CoV-2 were detected in 33 percent of the 481 samples collected from January 2020 through 2021 in Illinois, Michigan, New York, and Pennsylvania. The results varied by State (Illinois = 7 percent of samples contained antibodies; Michigan = 60 percent; New York = 18 percent; and Pennsylvania = 34 percent). The results indicate that certain white-tailed deer populations in these States were exposed to SARS-CoV-2.

We detected SARS-CoV-2 antibodies in only 1 of the 241 samples collected before January 2020 (pre-COVID-19 pandemic in people). The single sample was at the minimum threshold of detection and was likely a false positive. This low-level detection is well within the expected false positive rate of the test used.

Did the deer get the virus from people, the environment, or other deer?

We do not know how the deer were exposed to SARS-CoV-2. It's possible they were exposed through people, the environment, other deer, or another animal species.



Could the deer spread the virus to people?

There is no evidence that animals, including deer, are playing a significant role in the spread of SARS-CoV-2 to people. Based on the available information, the risk of animals spreading COVID-19 to people is low.

Do deer show clinical signs of illness?

This was not the focus of our study. However, there were no reports of clinical illness associated with SARS-CoV-2 in the deer populations we surveyed, and clinical signs of SARS-CoV-2 have not been observed in wild white-tailed deer. In addition, captive deer experimentally infected with SARS-CoV-2 as part of a USDA Agricultural Research Service study did not show clinical signs of illness.

Could the test be detecting antibodies to another virus (i.e., might the test be cross-reacting)?

Scientists at APHIS' National Wildlife Research Center used a commercially available SARS-CoV-2 antibody screening test known to be highly specific (accurate) for use in other species. However, it has not been validated on deer. To help reduce concerns that the commercial test may have detected antibodies to another virus (also known as cross-reacting), we also tested a subset of samples at APHIS' National Veterinary Services Laboratories in Ames, IA, using a different test specific to SARS-CoV-2. Both analyses resulted in identical findings.

In addition, scientists looked at samples collected before and after SARS-CoV-2 was detected in people in the United States. If the tests were cross-reacting with antibodies to another virus, researchers would have detected that in the archived samples. They did not.

* Per [2018 data](#) from the Association of Fish and Wildlife Agencies

What is the difference between exposure and active infection?

An animal is said to have been “exposed” to or infected with a pathogen when antibodies to a pathogen are detected in its blood. Antibodies are the result of an immune response to infection with a pathogen, and their presence does not necessarily suggest a current infection. The tests used to analyze the deer serum samples in this study can only detect antibodies, not the virus itself.

Is APHIS planning to do any more surveillance or research?

Further research is needed on the significance of SARS-CoV-2 antibodies in free-ranging white-tailed deer, including how the deer were exposed to the virus and potential impacts, if any, to overall deer populations, other wildlife, and people. APHIS is working closely with Federal and State partners, including the U.S. Department of the Interior, the Centers for Disease Control and Prevention, and the Association of Fish and Wildlife Agencies, to determine next steps.

The American Rescue Plan Act of 2021 includes a provision on agriculture pandemic response. APHIS has been designated as the lead agency for increasing and enhancing the U.S. animal health system to address emerging and zoonotic diseases, including SARS-CoV-2, in susceptible animals like white-tailed deer. Carrying out this charge requires careful thought and planning, as well as stakeholder input. APHIS is working diligently to make sure we leverage this funding in a way that effectively addresses the One Health risks posed by SARS-CoV-2 while also planning for future threats with pandemic potential.