

Wild Pig, Peccary and Hippo Taxon Advisory Group

Animal Care Considerations to Prevent the Spread of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)

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Pigs are susceptible to infection with several different coronaviruses, causing intestinal and respiratory infections. These swine viruses are different from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Covid-19 refers to the disease caused by SARS-CoV-2 in humans.

SARS-CoV-2 enters a cell by interacting with a cellular receptor named angiotensin-converting enzyme 2 (ACE2). ACE2 is present primarily in cells of the lungs and is widely expressed across the animal kingdom. However, the structure of ACE2 can vary, affecting the way that this receptor interacts with SARS-CoV-2. ACE2 receptors in humans, non-human primates, bats, ferrets, cats, and pigs are structurally similar and compatible with SARS-CoV-2. It is not known if wild pigs, peccaries, and hippos have ACE2 receptors that are structurally compatible with SARS-CoV-2.

Theoretically, species with ACE2 receptors that are compatible with SARS-CoV-2 may be susceptible to infection. In experimental studies, SARS-CoV-2 did not cause infection when the virus was placed directly into the nose of pigs. These nasally-inoculated pigs did not form an infection, did not shed virus, did not infect other pigs, and did not develop an antibody response to the virus. The authors conclude that (domestic) pigs are not susceptible to infection with SARS-CoV-2. Information about the behavior of SARS-CoV-2 in wild pigs, peccaries, and hippos is not known.

The Centers of Disease Control (CDC) recommends several practices to help prevent the community spread of SARS-CoV-2. We can adopt these recommendations within our zoos to create safe working spaces for our colleagues, as well as safe living spaces for our animals. Institutions should perform individual risk assessments based on SARS-CoV-2 prevalence in their area and presence of potentially susceptible species. The Zoo and Aquarium All Hazards Preparedness, Response, and Recovery (ZAHP) Fusion Center is an excellent resource (<https://zahp.aza.org/covid-19-animal-care/>).

Concepts

- Domestic pigs have a similar SARS-CoV-2 receptor as do humans
 - Experimental inoculation of domestic pigs with SARS-CoV-2 has not caused infection to date
 - Information about SARS-CoV-2 in wild pigs, peccaries, and hippos is lacking
- Humans can be infected and shed virus without showing clinical signs of disease
- Virus is thought to be spread via respiratory droplets
- Virus can survive outside of the body
 - Aerosols – up to 3 hours
 - Paper products – up to 24 hours
 - Metal and plastic surfaces – up to 3 days

Interpretation

- Humans – Treat humans as potentially infected and shedding the virus, even if they appear healthy
- Animals – Treat wild pigs (especially *Sus* spp.) as potentially susceptible to infection with SARS-CoV-2
- Environment – Treat surfaces as potentially contaminated

Controls

- Limit contact
 - Expand physical distancing to include pigs
 - Adjust shifting, feeding, and training practices
 - Minimize the number of people interacting with pigs
- Reduce environmental contamination
 - Wear a face cover
 - Working around pigs
 - Preparing animal food
 - Using shared human work spaces
 - Wash hands frequently
 - Disinfect environmental surfaces
 - Animal items – Food and water dishes, enrichment items
 - Work spaces – Special attention to common touch points such as handles, knobs, switches

These controls are in addition to standard workplace protections against pathogen transmission, such as cleaning and disinfection, eye protection when hosing, not eating or drinking in animal spaces, and frequent hand washing.

Due to the global shortage of personal protective equipment for human health care workers, it is recommended to be conscientious about use of surgical masks and respirator masks. Here is some information for consideration when making recommendations to your staff about the use of protective barriers to reduce the spread of SARS-CoV-2.

Face covers

- Purpose
 - Prevent the transfer of respiratory droplets and saliva to another person, animal, or environment
- Definition
 - Barrier that covers the mouth and nose
 - Cloth – Buff, bandana, T-shirt, other fabric
 - Plastic – Homemade or manufactured face shields
- Use
 - When in proximity to humans and potentially susceptible animal species
 - When using shared human work spaces
- Care
 - Putting on and taking off face covering
 - Wash hands before and after touching face covering
 - Do not touch eyes, nose, and mouth when manipulating face covering
 - Wash face covering regularly, frequency based on use

Medical masks

- Purpose
 - Prevent the transfer of an infectious agent to the respiratory tract of the wearer
- Definition
 - Surgical mask – Multi-layered fabric that is worn loosely
 - Respirator mask (N95) – Polymer cup that forms to the face to create a seal
- Use
 - Intimate contact between people and susceptible species, such as during medical procedures
- Care
 - Designed for single use and not to be shared
 - Some sources have explored options for sterilization and reuse

References

- Wan Y, et al. 2020. Receptor recognition by the novel coronavirus from Wuhan: an analysis based on decade-long structural studies of SARS coronavirus. J Virology 94: e00127-20.
- Shi J, et al. 2020. Susceptibility of ferrets, cats, dogs, and different domestic animals to SARS-coronavirus-2. Science 08 April 2020.
- Novel coronavirus SARS-CoV-2: Fruit bats and ferrets are susceptible, pigs and chickens are not. Press release from the Friedrich-Loeffler-Institut 02 April 2020. <https://www.fli.de/en/press/press-releases/press-singleview/novel-coronavirus-sars-cov-2-fruit-bats-and-ferrets-are-susceptible-pigs-and-chickens-are-not/>