

## SYNOPSIS

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# Review of “Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2”

**Article citation:** Shi J, Wen Z, Zhong G, Yang H, Wang C, Huang B, et al. Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS-coronavirus 2. *Science*. 2020 Apr 8 [Epub ahead of print]. Available from: <https://science.sciencemag.org/content/sci/early/2020/04/07/science.abb7015.full.pdf>

## One-Minute Summary

- This study investigated the susceptibility of laboratory (ferrets), companion (cats, dogs) and domestic animals (chickens, ducks, pigs) to coronavirus disease 2019 (COVID-19) virus.
- The authors detected COVID-19 viral RNA and infectious virus in upper respiratory tract of ferrets at day four post inoculation (pi) (4/4).
  - In an additional study on COVID-19 replication, the authors reported infectious COVID-19 virus in nasal washes of all ferrets (6/6) but not in rectal swabs (0/6). COVID-19 replicated in the ferret upper respiratory tract (nasal turbinate, soft palate, tonsils) for up to 8 days pi, without severe disease or death.
- The authors detected COVID-19 viral RNA and infectious virus in the upper and lower respiratory tract of sub-adult cats (4/4; 3 and 6 day pi) and juvenile cats (4/4; 3 and 6 day pi).
  - COVID-19 replicated efficiently (with infectious COVID-19 detected) in the upper and lower respiratory tract of cats, especially younger cats. The authors report that droplet transmission of COVID-19 occurred between infected and naïve cats in adjacent cages.
- The authors did not detect COVID-19 RNA in oropharyngeal swabs of dogs (0/5), pigs (0/5), chickens (0/5) or ducks (0/5). However, the authors noted viral RNA was detected in rectal swabs of dogs (2/4).
- In addition to COVID-19 RNA detection, the authors reported seroconversion (ELISA and neutralization assay) in ferrets (2/2), cats (3/3) and dogs (2/4; ELISA only).
- The authors conclude that **ferrets and cats are highly susceptible to COVID-19**, with **little susceptibility in dogs** and **no susceptibility in pigs, chickens and ducks**.

## Additional Information

- The authors inoculated animals intranasally with either a COVID-19 isolate from the environment (Wuhan Seafood Market, Wuhan, China) or a human patient (Wuhan, China).
- The authors used quantitative PCR to detect COVID-19 RNA in animal organs or samples (oropharyngeal or rectal swabs).
- To determine if organs or samples contained infectious virus, the authors performed virus titration in Vero-E6 cells.

## PHO Reviewer's Comments

- The authors infected cats and ferrets with a high dose of COVID-19 ( $10^5$  plaque forming unit [PFU]); however, under natural conditions, it is unlikely these animals would be exposed to this level of infectious dose.
- Feces collected from cats were not titrated on Vero-E6 cells; therefore, transmission of COVID-19 via the fecal-oral route cannot be ruled out. The proximity of the cat cages (between infected and uninfected cat cages) was 4 cm; therefore, transmission might have occurred through means other than respiratory droplets (e.g., fecal-oral route).
- The authors performed these experiments under controlled laboratory conditions with a relatively low number of animals; therefore, readers must use caution when interpreting the results in the context of zoonotic transmission.
- The fact that COVID-19 virus replicates efficiently in the upper respiratory tract of ferrets makes them a candidate animal model for evaluating antiviral drugs or vaccine candidates against COVID-19.

## Citation

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