

CORONAVIRUS DISEASE 2019 UPDATE (88): GERMANY, ANIMALS, RESEARCH, PIG, CHICKEN, BAT, FERRET

A ProMED-mail post. ProMED-mail is a program of the International Society for Infectious Diseases.

Date: Mon 7 Apr 2020. From: Martin Beer <Martin.Beer@fli.de> [edited]

COVID-19: Experimental infection of fruit bats, ferrets, pigs and chicken with SARS-CoV-2 at Friedrich-Loeffler-Institute

SARS-CoV-2 is a recently emerged zoonotic pathogen, and susceptibility of different animals that are either known virus reservoirs, might serve as animal models or are possibly in close contact with infected humans is still understudied. Here we report on SARS-CoV-2 infection experiments in fruit bats, ferrets, pigs and chickens.

Animals were intranasally inoculated with 10^5 TCID₅₀ and monitored for virus shedding by samples taken from the upper respiratory tract as well as fecal samples. In addition, animals were euthanized for necropsy at different time points. In all experiments, contact animals were also investigated.

We report here that pigs (n=9) and chickens (n=17) were not susceptible to intranasal infection by SARS-CoV-2. All swab samples as well as organ samples and contact animals remained negative for SARS-CoV-2-RNA. In contrast, intranasal inoculation of *Rousettus aegyptiacus* fruit bats (n=9) resulted in a transient infection in the respiratory tract, with virus replication detectable in the nasal epithelium, trachea, lung and lung associated lymphatic tissue. Infectious virus was isolated from the nasal epithelium and trachea of one animal at 4 days post infection. We also detected viral RNA in the nasal epithelium of 1 out of 3 contact animals sacrificed at day 21 post infection.

Most efficient virus replication was observed in ferrets, with high yields of viral RNA in nasal washing fluids from 8 of 9 animals from 2 days post infection (dpi) to 8 dpi. Interestingly, all 3 non-inoculated contact ferrets became infected and viral RNA was present in nasal washing fluids starting at 12 dpi. Screening of organ samples revealed prominent viral RNA loads only in the upper respiratory tract as confirmed by positive immunohistochemistry and in situ-hybridization in the nasal cavity. SARS-CoV-2 reactive antibodies were detected from day 8 in the inoculated ferrets and in one contact ferret on day 21 dpi.

In summary, pigs and chickens could not be productively infected by SARS-CoV-2 under these experimental conditions, an information that is relevant for a solid risk assessment. Furthermore, virus replication in ferrets resembles the situation of a mild human infection and this species might serve as a useful model for further studies e.g. testing vaccines or antivirals.

[The FLI COVID-19-Team; Balkema-Buschmann A., Beer M., Breithaupt A., Graaf A., Groschup, M., Grund Ch., Harder T., Hoffmann D., Mettenleiter Th. C., Rissmann M., Schlottau K., Schoen J.]

Martin Beer. Friedrich-Loeffler-Institut. Greifswald-Insel Riems. Germany
[We are grateful to the FLI team for this firsthand information.]

This report of experimental infection trials in FLI, involving bats, ferrets, pigs and chickens, deserve to be compared with recent animal experimental trials reported from China (<http://promedmail.org/post/20200402.7173286>, item 2).