### Natural and Experimental Susceptibility of Different Animals to SARS-CoV-2*

<table>
<thead>
<tr>
<th>Type of Infection</th>
<th>Species</th>
<th>Route: Experimental infection</th>
<th>Cases: Natural infection</th>
<th>Subclinical infection</th>
<th>Clinical signs</th>
<th>Seroconversion</th>
<th>Documented Shedding (RNA)</th>
<th>Transmission to other animals</th>
<th>Susceptible to Reinfection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural and Experimental</td>
<td>Cat</td>
<td>Intranasal, oral, tracheal, ocular**</td>
<td>8</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Rectal, nasopharyngeal</td>
<td>Yes, direct and indirect</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td>Dog</td>
<td>Intranasal</td>
<td>3</td>
<td>Yes***</td>
<td>May be⁶</td>
<td>Yes</td>
<td>Rectal, nasopharyngeal</td>
<td>No</td>
<td>Unknown</td>
</tr>
<tr>
<td>Natural</td>
<td>Tiger</td>
<td>n/a</td>
<td>5</td>
<td>Yes</td>
<td>Yes</td>
<td>Unknown</td>
<td>Rectal (fetal)</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td>Lion</td>
<td>n/a</td>
<td>3</td>
<td>Unknown</td>
<td>Yes</td>
<td>Unknown</td>
<td>Rectal (fetal)</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td>Mink</td>
<td>n/a</td>
<td>Several</td>
<td>Yes</td>
<td>Yes</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Likely⁷⁶</td>
<td>Unknown</td>
</tr>
<tr>
<td>Experimental: Susceptible</td>
<td>Hamster</td>
<td>Intranasal</td>
<td>n/a</td>
<td>Unknown</td>
<td>Yes</td>
<td>Yes</td>
<td>Unknown</td>
<td>Yes, direct contact</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td>Ferret</td>
<td>Intranasal</td>
<td>n/a</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Rectal, nasal</td>
<td>Yes, direct and indirect</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td>Rabbit</td>
<td>Not yet reported⁶⁶</td>
<td>n/a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cynomolgus macaque</td>
<td>Intratracheal, conjunctival</td>
<td>n/a</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Rectal, nasopharyngeal</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td>Rhesus macaque</td>
<td>Intranasal, intratracheal, oral, ocular</td>
<td>n/a</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Rectal, nasopharyngeal</td>
<td>Unknown</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Common marmoset</td>
<td>Intranasal</td>
<td>n/a</td>
<td>Yes⁸</td>
<td>No</td>
<td>Unknown</td>
<td>Rectal, nasopharyngeal</td>
<td>Unknown</td>
<td>Unknown</td>
</tr>
<tr>
<td>Experimental: Not Susceptible</td>
<td>Pig</td>
<td>Intranasal</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Chicken</td>
<td>Intranasal</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Duck</td>
<td>Intranasal</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Mouse</td>
<td>Intranasal</td>
<td>n/a</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Unknown</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

* Hello Autran de Morais - last update: May 17, 2020; ** Intranasal in one study, a combination of all routes in the other; *** Dogs were less susceptible to infection than cats and ferrets; ⁶ One pug with transient respiratory signs and anorexia; ⁶⁶ Minks are kept in isolated cages and indirect transmission is likely; ⁶⁶⁶ Susceptibility based on reports from the Dutch government; ⁸ Common marmosets were less susceptible to infection than macaques
References:

Cats:

- **Experimental infection**
    [https://science.sciencemag.org/content/early/2020/04/07/science.abb7015](https://science.sciencemag.org/content/early/2020/04/07/science.abb7015)

- **Clinical cases:**
  - **Cat: Hong Kong**
  - **Cat: Belgium**
    OIE. Information provided by the National Veterinary Services of Belgium (03/28/2020). OIE, 2020. [https://www.oie.int/fileadmin/Home/eng/Our_scientific_expertise/docs/pdf/COV-19/Belgium_28.03.20.pdf](https://www.oie.int/fileadmin/Home/eng/Our_scientific_expertise/docs/pdf/COV-19/Belgium_28.03.20.pdf)
  - **Cars (2): US**
  - Cat #1: France (Bordeaux)
  - Cat #2: France (Île-de-France)
- Cat: Spain
- Cat: Germany
- Cats: Netherlands (serology)
**Dogs:**

- Experimental infection
  - Shi, J et al. Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS–coronavirus 2. *Science*, 08 Apr 2020: eabb70; DOI: 10.1126/science.abb7015. [https://science.sciencemag.org/content/early/2020/04/07/science.abb7015](https://science.sciencemag.org/content/early/2020/04/07/science.abb7015)

- Clinical cases:
  - Pomeranian (Hong Kong)
    - Sit, THC et al. Canine SARS-CoV-2 infection. *Nature Research*. 2020. preprint. DOI: [10.21203/rs.3.rs-18713/v1](10.21203/rs.3.rs-18713/v1)
  - German Shepherd (Hong Kong)
  - Pug (USA)
  - American Bulldog (Netherlands, serology)
**Minks:**
- Clinical cases

**Tigers and Lions:**
- Clinical cases
  - Bronx Zoo Press release - A Tiger at Bronx Zoo Tests Positive for COVID-19; The Tiger and the Zoo’s Other Cats Are Doing Well at This Time. 04-05-2020. [https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/14010/A Tiger at Bronx Zoo Tests Positive for COVID-19 The Tiger and the Zoo’s Other Cats Are Doing Well at This Time.aspx](https://newsroom.wcs.org/News-Releases/articleType/ArticleView/articleId/14010/A Tiger at Bronx Zoo Tests Positive for COVID-19 The Tiger and the Zoo’s Other Cats Are Doing Well at This Time.aspx)
Hamsters:
- Experimental infection
**Ferrets:**
- Experimental infection
  - Shi, J et al. Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS–coronavirus 2. *Science*, 08 Apr 2020: eabb70; DOI: 10.1126/science.abb7015. [https://science.sciencemag.org/content/early/2020/04/07/science.abb7015](https://science.sciencemag.org/content/early/2020/04/07/science.abb7015)
  - Kim, YI. Infection and Rapid Transmission of SARS-CoV-2 in ferrets. *Cell Host & Microbe* 2020, 27, 1–6. [https://doi.org/10.1016/j.chom.2020.03.023](https://doi.org/10.1016/j.chom.2020.03.023)

**Rabbits:**
- Experimental infection
    - The unpublished study from the University of Rotterdam is mentioned in the letter

**Mice:**
- Experimental infection
  - Bao, L. The Pathogenicity of SARS-CoV-2 in hACE2 Transgenic Mice. *Nature*. 2020. [https://doi.org/10.1038/s41586-020-2312-y](https://doi.org/10.1038/s41586-020-2312-y)

**Cynomolgus macaque: (Macaca fascicullaris)**
- Experimental infection
  - Rockx, B et al. Comparative pathogenesis of COVID-19, MERS, and SARS in a nonhuman primate model. *Science* 17 Apr 2020: DOI: 10.1126/science.abb7314. [https://science.sciencemag.org/content/early/2020/04/16/science.abb7314](https://science.sciencemag.org/content/early/2020/04/16/science.abb7314)

**Rhesus macaque: (Macaca mulatta)**
- Experimental infection


**Common marmoset: (*Callithrix jacchus*)**
- Experimental infection

**Pigs:**
- Experimental infection
  - Shi, J et al. Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS–coronavirus 2. *Science*, 08 Apr 2020: eabb70; DOI: 10.1126/science.eabb7015. [https://science.sciencemag.org/content/early/2020/04/07/science.eabb7015](https://science.sciencemag.org/content/early/2020/04/07/science.eabb7015)
  - ProMED International Society for Infectious Diseases. COVID-19 update (110): Germany, France, animal, research (04-10-2020) [https://promedmail.org/promed-post/?id=7205881](https://promedmail.org/promed-post/?id=7205881)

**Chicken:**
- Experimental infection
  - Shi, J et al. Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS–coronavirus 2. *Science*, 08 Apr 2020: eabb70; DOI: 10.1126/science.eabb7015. [https://science.sciencemag.org/content/early/2020/04/07/science.eabb7015](https://science.sciencemag.org/content/early/2020/04/07/science.eabb7015)
  - ProMED International Society for Infectious Diseases. COVID-19 update (110): Germany, France, animal, research (04-10-2020) [https://promedmail.org/promed-post/?id=7205881](https://promedmail.org/promed-post/?id=7205881)

**Ducks:**
- Experimental infection
  - Shi, J et al. Susceptibility of ferrets, cats, dogs, and other domesticated animals to SARS–coronavirus 2. *Science*, 08 Apr 2020: eabb70; DOI: 10.1126/science.eabb7015. [https://science.sciencemag.org/content/early/2020/04/07/science.eabb7015](https://science.sciencemag.org/content/early/2020/04/07/science.eabb7015)