

RAPID QUALITATIVE RISK ASSESSMENT: SARS Coronavirus 2 (SARS-CoV-2) in Companion Animals

Iteration #2: April 28, 2020

Summary

The primary route for exposure of humans to SARS-CoV-2 is via other humans. It is unlikely that companion animals play a major role in the spread of this human disease, or that it poses a major risk to animal health. However, there is currently a moderate to high level of uncertainty related to infection in mammals other than humans.

Recently, a few experimental studies have been conducted on companion animal species (Chan et al., 2020; Friedrich-Loeffler-Institut, 2020; Kim et al., 2020; Shi et al., 2020), and sporadic cases have been reported in pets owned by people with COVID-19 (World Organisation for Animal Health, 2020a; b; c; d). Negative findings are also being reported (IDEXX Laboratories, 2020; Temmam et al., 2020; Washington State University, 2020). It is likely that further evidence related to infection in companion animals, whether positive or negative, will be forthcoming. As a result of this, and the need to make decisions regarding guidance and handling of mammalian pets belonging to human cases of COVID-19, this iterative risk assessment process was initiated.

An Emergency Collective Expert Appraisal Group was formed, consisting of volunteers from federal, provincial and territorial departments of public and animal health, veterinary associations and academia. This group was convened to provide expert advice on certain aspects of the risk assessment, to discuss current knowledge and identify areas of uncertainty. The group meets regularly to discuss updated information and its effect on the risk. The findings and conclusions represent the consensual, but not necessarily unanimous, opinions of the working group participants, and do not necessarily represent the views of the participants' respective organizations.

The assessment addresses the following specific risk question:

- **What is the probability and impact of human exposure to SARS-CoV-2 from mammalian pets owned by infected humans in Canada, via spread of infection from the pet to other people?**

The assessment makes a number of assumptions, including that the source of exposure of a mammalian pet would be an infected owner, and that the context for the assessment is the current pandemic situation. Figure 1 describes the scenario pathway for this assessment. In order to become infected, pets must first be exposed to an infectious dose of the virus through direct or indirect contact with their infected owner, and the pet must be susceptible to developing infection. Then, even if pets are exposed and infected, further transmission of the virus is dependent on the infected pet shedding a sufficient amount of the virus in respiratory secretions, vomit, feces, or other bodily fluids, and then having sufficient direct or indirect contact with a non-infected human.

The overall probability of human exposure to SARS-CoV-2 from mammalian pets owned by infected humans, via infection of the pet, is considered to be (see Appendix for definitions of estimates):

- Most likely low for dogs, but ranging from negligible to low due to variability. Dogs generally have close contact with their owners, but initial information suggests dogs may need to be exposed to a higher dose for infection and that they have a lower likelihood of shedding than other companion animals. The uncertainty is moderate to high.
- Most likely moderate for cats, but ranging from very low to moderate due to variability. The evidence suggests cats are susceptible to infection, and capable of at least some level of shedding; however the amount of contact they have with people other than their owners is highly variable. The uncertainty is moderate to high.
- Most likely low for ferrets, but ranging from very low to moderate. Experimental evidence suggests that ferrets are quite susceptible to infection and shedding, but most ferrets have very little contact with humans other than their owner. The likelihood may be higher for veterinary staff. The uncertainty is moderate to high.
- Most likely very low to low for other small mammals, but ranging from very low to moderate. This is highly dependent on species, with hamsters at the higher end of the scale and other small mammals at the lower end. These animals tend to spend most of their time in a cage and have limited contact with people. The uncertainty is high.

These estimates could be updated as more information becomes available. Variability in the estimate is dependent on risk factors, such as: extent of human-animal physical interaction, extent that the animal roams freely in the household (ferrets and other small mammals) or outside (cats), extent of contact with people other than the owner, extent of infection control (e.g. hand hygiene) between the pet and humans, living conditions (e.g., house versus apartment), comorbidities in the pet or human, and the occupation or lifestyle of the person (i.e., general public versus veterinarians). The probability of being infected by another person is notably higher than any probability of being infected via a pet. The greatest risk of infection for other humans in the household is the infected human in the household.

Key uncertainties that will affect the probability estimate include: infectious dose, and the probability of infection and shedding of an infectious dose by the pet. Evidence is provided in a small number of experimental studies on dogs, cats, ferrets and hamsters. Worldwide, natural infection has only been documented in a few dogs and cats from COVID-19-positive households.

Given the current context of a global pandemic, with a vast number of cases resulting from exposure to sources other than mammalian pets, the overall national-scale impact associated with this hazard is considered to be negligible to low. The impact could be higher in particular cases involving highly susceptible individuals.

It is strongly recommended that risk assessments be conducted on a case-by-case basis, as required, particularly for those individuals that must have very close contact (veterinarians and veterinary technicians) with species that have been shown to become infected and shed virus (cats, ferrets and Syrian hamsters).

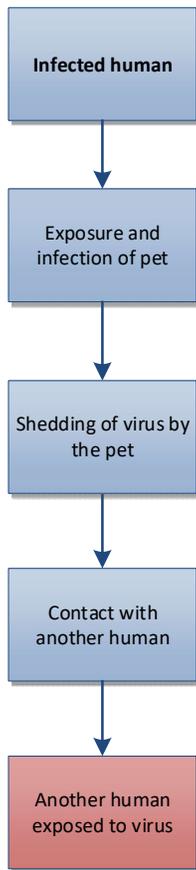


Figure 1: Scenario pathway illustrating the infection of a mammalian pet to SARS-CoV-2, and subsequent exposure of susceptible humans.

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Appendix: Definitions of qualitative estimates

Table 1 - Likelihood Definitions

Likelihood of event occurring	Descriptive Definition	Likelihood of event NOT occurring
Negligible	The likelihood of the event is virtually zero	High
Very low	The event is very unlikely	Moderate
Low	The event is unlikely	Low
Moderate	The event is fairly likely	Very low
High	The event is likely	Negligible

Table 2 – Uncertainty categories¹

Uncertainty category	Interpretation
Low	There are solid and complete data available; strong evidence is provided in multiple references; authors report similar conclusions. Several experts have multiple experiences of the event, and there is a high level of agreement between experts.
Moderate	There are some but not complete data available; evidence is provided in a small number of references; authors report conclusions that vary from one another. Experts have limited experience of the event and/or there is a moderate level of agreement between experts.
High	There are scarce or no data available; evidence is not provided in references but rather in unpublished reports or based on observations, or personal communication; authors report conclusions that vary considerably between them. Very few experts have experience of the event and/or there is a very low level of agreement between experts.

Table 3. Guidelines for determining the overall, national-scale impact of establishment and/or spread²

Overall impact	Description of impact
Extreme	The effects are likely to be severe at the national level. Implies that economic stability, societal values or social well-being would be significantly affected.
High	The effects are likely to be significant at the national level and severe within affected zones. Implies that the effects would be of national concern. However, significant effects on economic stability, societal values or social well-being would be limited to a given zone.
Moderate	The effects are likely to be minor on a national level and significant within affected zones. The effects are likely to be severe for directly affected parties.
Low	The effects are likely to be minor within affected zones and significant to directly affected parties. The effects are likely to be minor at the national level.
Very low	The effects are likely to be minor to directly affected parties. The effects are likely to be indiscernible at any other level.
Negligible	The effects are likely to be indiscernible at any level within Canada.

¹Source: Fournie G, Jones BA, Beauvais W, Lubroth J, Njeumi F, Cameron A & Pfeiffer DU, 2014. The risk of rinderpest re-introduction in post-eradication era. *Prev Vet Med* 113 (2): 175-184.

²Modified from: Biosecurity Australia, 2009. Draft Import risk analysis report for horses from approved countries: final policy review [Internet]. Available at: http://www.daff.gov.au/__data/assets/pdf_file/0018/1410651/2009_28_Horses_draft_IRA_report.pdf (last accessed 2014-04-04).