



Considerations for sampling, testing, and reporting of SARS-CoV-2 in animals

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COVID-19, caused by infection with SARS-CoV-2, is a human disease which most likely emerged from an animal source and through widespread human to human transmission became a pandemic. COVID-19 is a reminder of the critical importance of the One Health approach. The nature of this new zoonotic virus, its widespread distribution, and the susceptibility of some animal species to infection means that close contact between people and animals may result in animal infections. The results of laboratory and epidemiological field investigations may provide evidence to better assess the implications of widespread human SARS-CoV-2 infections for animal health and welfare, veterinary public health, and wildlife conservation. This information can support a range of risk mitigation measures. However, the decision to carry out animal sampling should have a strong rationale and consider the broader public health response to COVID-19, including the availability of resources for human sampling and public health measures in place to limit disease spread.

Further information on current knowledge about SARS-CoV-2 in animals can be found on the OIE website: <https://www.oie.int/scientific-expertise/specific-information-and-recommendations/questions-and-answers-on-2019novel-coronavirus>

Further information on the public health aspects of COVID-19 can be found on the WHO website: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>

Purpose

The purpose of this document is to provide high level considerations on sampling, testing, and reporting of SARS-CoV-2 in animals.

Scope

The following considerations are intended to be non-prescriptive and broad enough to cover a range of human and animal interactions. The document aims to differentiate individual case management from research.

This document will be reviewed and updated as new scientific evidence of SARS-CoV-2 infection in animals comes to light.

1. SARS-CoV-2 as an emerging disease in animals

Collaboration and coordination across all relevant sectors and disciplines, using a One Health approach, is required to address zoonotic diseases and other shared health threats at the human-animal-environment interface. This involves a broad range of actors including the Veterinary Services, public health services, wildlife agencies, ecology organisations, and the private sector.

To assess and mitigate risks of an emerging disease at the human-animal-environment interface, under certain circumstances it may be appropriate to sample and test animals for SARS-CoV-2. However, the decision to sample and test animals must carefully consider the benefits and scientific rationale e.g. what knowledge will be gained and what action can be taken, against potential negative consequences such as impacts on animal health and welfare and public health. In some situations, there may be competition for valuable resources needed for the public health response. The decision to sample must consider (and support) the broader national public health strategy for COVID-19 which will vary between countries.

2. High level guiding principles for sampling and testing

Based on current evidence, widespread testing of animals for SARS-CoV-2 is not recommended. Joint risk assessment carried out by public health and Veterinary Authorities (perhaps, in some cases involving wildlife experts) may guide the decision on whether to sample and test animals under certain defined circumstances. Sampling and testing of animals could be considered in situations where the results will inform decision making, animal case or population management, or public health response, or further the body of knowledge on the transmission of the virus. Guidance already exists on measures to take when animals have close contact with humans suspected or confirmed to be infected with SARS-CoV-2 (see OIE [COVID-19 Q and A](#)).

Any sampling and testing of animals must consider the broader response to COVID-19 and be coordinated with public health services. The decision should also consider the potential need to prioritise the availability of valuable resources (such as personal protective equipment (PPE), laboratory staff, diagnostic reagents) for public health services. Information about animal infections should complement, rather than distract attention from or confuse, the important public health risk communication messages. Communication of test results should avoid inappropriate measures being taken against domestic or wild animals which might compromise their welfare or health or have a negative impact on international trade or biodiversity, if misinterpreted.

Consideration should be given to the public health implications associated with handling and sampling of potential positive animals as it puts people at risk and requires appropriate PPE. This could include risks from moving animals (by owners) from their household, temporary shelter, or settings where animals are gathered in a larger group (e.g. farm, animal feeding operation, animal shelter, boarding facility, zoo, or other animal holding) for testing, or for veterinarians being exposed to humans infected with COVID-19 during sampling in either the clinic, household setting, or other setting.

Sampling should be done by competent personnel trained in the correct use of PPE, and chain of custody of samples should be maintained. Depending on the type of test, samples may include single or combinations of oropharyngeal, nasal, and rectal swabs, and blood. When collecting and taking samples, care should be taken to avoid cross-contamination from the environment or from infected humans.

The laboratory should use a validated test, appropriate to the purpose of testing, which is important when testing across different species due to potential variation in sensitivity and specificity. If a private laboratory tests animal samples, close communication and coordination should be maintained with the Veterinary Authority. If real-time RT-PCR is used for detection and borderline PCR cycle threshold (Ct) values are obtained, further validation and confirmatory testing may be required.

The actions to be taken on positive or negative findings should be carefully planned for before sampling and testing of animals for SARS-CoV-2.

3. Rationale for testing of animals to manage risk

Sampling and testing of animals should not be conducted without a clear rationale. The rationale should consider the risk of infection of animals, the risk of exposure to other susceptible animals or humans, and the consequences of exposure. Animal testing strategies should be coordinated with the public health response and consider the need to prioritise resources (including reagents, laboratory capacity, technical personnel, PPE etc.) for the overall response to COVID-19.

The table below has been adapted from a version initially developed collaboratively by the Centers for Disease Control and Prevention and the US Department of Agriculture, USA¹. It provides epidemiological risk factors and clinical features that can guide decisions on the testing of animals for the purpose of case management.

Epidemiological Factors		Clinical Features	
Animal with history of close contact with a person or animal suspected or confirmed to be infected with SARS-CoV-2	AND	Animal has clinical signs* suspicious of SARS-CoV-2 infection.	
Animal with exposure to a known high-risk environment (i.e., where human cases and/or animal cases have occurred), such as a residence, facility, or vessel (e.g. nursing home, prison, cruise ship)			
Threatened, endangered or otherwise animal of high conservation value in a rehabilitation, captive breeding or zoological facility when there is suspicion of contact with a SARS-CoV-2 infected person or animal.	AND	Animal is asymptomatic; OR Animal has clinical signs* suspicious of SARS-CoV-2 infection	
Animals in a mass care or group setting (e.g., farm, animal feeding operation, animal shelter, boarding facility, zoo or other animal holding) including companion animals, livestock, and other species, where their exposure history to people with SARS-CoV-2 infection is unknown.	AND	A single case, or cluster of animals show clinical signs* suspicious of SARS-CoV-2 infection.	

* For more information on clinical signs see section 4. Some animals have been infected with SARS-CoV-2 without showing clinical signs. Therefore, there may be instances when asymptomatic animal(s) may be tested based on veterinary clinical and/or public health judgement.

The following are examples of general considerations for sampling and testing different categories of animals in the context of risk management:

- **Companion animals**
 - The likelihood of human to animal transmission through close contact between humans (e.g. owners, general public, workers, visitors etc.) and animals
 - Potential frequency and number of animal contacts with humans (e.g. for working or service animals) and other animals
 - Susceptibility of different animal species to infection
 - The likelihood of companion animals spreading infection to other households through contact with other companion animals or directly with humans in other households
 - The likelihood of companion animals spreading infection to other contact animals (e.g. gatherings, colonies, stray animals, free ranging)
 - The likelihood of spread through trade and movement

¹ <https://www.cdc.gov/coronavirus/2019-ncov/php/animal-testing.html>

- Potential consequences of exposure (human infection and illness; vulnerable individuals or groups; disease spread; establishment of animal reservoirs; high risk settings)
- **Livestock**
 - The likelihood of human to animal transmission through close contact between humans (e.g. workers, visitors etc.) and groups of animals
 - Susceptibility of different animal species to infection
 - The likelihood of virus amplification in susceptible species (close contact between animals and size of groups)
 - The likelihood of spread through trade and movement
 - Potential consequences of exposure (human infection and illness; animal infection and illness; animal production; disease spread; economic; establishment of animal reservoirs)
- **Wildlife**
 - The likelihood of human to wild animal transmission through contact between humans (e.g. researchers, conservationists, volunteers, public) and wildlife species
 - Susceptibility of different wild animal species to infection
 - The likelihood of infection of other wildlife following release of captive wild animals to the field
 - Translocation of wildlife from one location to another
 - The likelihood of infection of high value endangered species
 - Potential consequences of exposure (human infection and illness; wildlife mortality and risk to conservation efforts/biodiversity; disease spread; establishment of new wildlife reservoirs)
- **Zoos (or zoological collections)**
 - The likelihood of human to animal transmission through contact between humans (e.g. workers, public) and captive animals in a zoo or zoological collection
 - Susceptibility of different animal species to infection
 - The likelihood of infection of high value endangered species
 - The likelihood of moving infection between zoos or zoological collections
 - Consequences of exposure (human infection and illness; disease spread; risk to conservation/biodiversity; economic)
- **Animal gatherings and group animal settings**
 - The likelihood of human to animal transmission through contact between humans (e.g. workers, general public, owners) and animals
 - Potential frequency and number of contacts with humans and other animals
 - Susceptibility of different animal species to infection
 - The likelihood of introducing infection to gathered animals
 - The likelihood of animal to animal transmission at the gathering (e.g. temporary, permanent, resident animals or visitor animals)
 - The likelihood of further spreading infection through dissemination of contact animals
 - Consequences of exposure (human infection and illness; disease spread; amplification of infection; risk to animal health; establishment of reservoirs)

4. Suggested Case definition

- SARS-CoV-2 Clinical Signs in animals:

To date there is limited knowledge about the susceptibility of different animal species. However, current evidence suggests clinical signs may include but are not limited to; nasal discharge, respiratory distress, coughing, vomiting or gastrointestinal disease. As in humans, mild or asymptomatic infections are likely to occur and should be considered in epidemiological investigations.

- Case definitions (may evolve with increasing information):

The following are suggested case definitions that can be adapted to local contexts.

Suspected case:

- SARS-CoV-2 infection can be suspected in an animal if;
 - Animal has clinical signs suggestive of SARS-CoV-2 infection (described above) and all other likely differential diagnostic aetiologies have been effectively ruled out by a veterinarian.

AND

- Animal has an epidemiological link with a confirmed human COVID-19 patient, SARS-CoV-2 infected animal or suggestive case history indicating potential exposure.

Confirmed case

The following defines a laboratory confirmed case of SARS-CoV-2 infection in an animal (with or without clinical signs):

- SARS-CoV-2 has been isolated from a sample* taken directly from an animal;

OR

- Viral nucleic acid has been identified in a sample* taken directly from an animal, giving cause for suspicion of previous association or contact with SARS-CoV-2, by:
 - a) Targeting at least two specific genomic regions at a level indicating presence of infectious virus; OR
 - b) Targeting a single genomic region followed by sequencing of a secondary target.

- * Samples for virus isolation and viral nucleic acid are preferably nasal swab, oropharyngeal swab, nasal washing, tracheal swab and/or a rectal sample may be taken, or a faecal sample may be used in situations where direct sampling is not possible due to risks to the animal or testing staff; or from internal organs collected post-mortem.

5. Reporting to the OIE

In accordance with [Chapter 1.1.](#) of the *Terrestrial Animal Health Code*, confirmed cases should be notified as an emerging disease to the OIE through the World Animal Health Information System (WAHIS). As per [Article 1.1.6](#) of the *Terrestrial Animal Health Code*, Member Countries are encouraged to report any other relevant information, such as experimental studies or prevalence surveys, to the OIE World Animal Health Information and Analysis Department as a summary report to information.dept@oie.int. In the context of early warning, Member Countries should send these reports in a timely manner.

The purpose of collecting and sharing this information at international level is to better understand SARS-CoV-2 epidemiology with a view to informing risk management and risk communication under a One Health approach.

The WAHIS system uses a standardised template. However, in order to capture the additional information which is critical to our understanding of emerging diseases, Countries are also encouraged to fill in the free text boxes available, giving particular consideration to the i) Zoonotic potential, ii) Description of the population affected by the outbreak², iii) Source of the outbreak or origin of infection, and iv) Epidemiological comments about the event. Particular attention should be given to providing information on the “Description of the population affected” that should focus on additional data at the outbreak level (i.e. clinical signs of the animals), and on the “Epidemiological comments” that should provide information at the event level (an “event” includes all epidemiologically related outbreaks (i.e. animal population survey, sampling information).

² As per definition of the *Terrestrial and Aquatic Animal Health Code*, an outbreak is defined as “the occurrence of one or more cases in an epidemiological unit.”