

Guidance on working with farmed animals of species susceptible to infection with SARS-CoV-2

In light of surveillance findings in mink which suggest genetic/antigenic drift of SARS-CoV-2 and amplification of virus, following introduction to mink from humans, the OIE has decided to publish draft guidance on reducing the risk of spillover from humans to domestic animals. The OIE encourages countries to promote these risk reduction strategies and to monitor susceptible animal species for SARS-CoV-2 infection.

Summary

COVID-19, caused by infection with SARS-CoV-2, is a human disease which has emerged from an animal source and became a pandemic through widespread human to human transmission. The nature of this zoonotic virus, its widespread distribution, and the susceptibility of some animal species to infection has led to animal infections resulting from contact between infected people and susceptible animals. This raises the concern that some animal species may become reservoirs of SARS-CoV-2.

The results of experimental infection studies combined with reports of natural animal infections have provided a growing body of knowledge to characterise animal species in terms of susceptibility to infection with SARS-CoV-2 and transmissibility of infection to other animals and humans. This guidance aims to: support Veterinary Services, public health, and other partners in reducing the risk of introduction of SARS-CoV-2 to susceptible farmed animal populations using a One Health approach; address the risks and risk pathways associated with different farming systems; and propose measures to follow in case of SARS-CoV-2 introduction to a farm.

Further information on current knowledge about SARS-CoV-2 in animals can be found on the OIE website: <https://www.oie.int/en/what-we-offer/emergency-and-resilience/covid-19/>

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/technical-guidance>

The GLEWS+ Risk Assessment on SARS-CoV-2 in animals used for fur farming can be found on the OIE website: https://www.oie.int/en/document/glews_risk_assessment_fur_animals_sars_cov_2/

Purpose

The following non-prescriptive high-level guidance aims to support Veterinary Services, public health, and other partners in reducing the risk of introduction of SARS-CoV-2 to farmed animal populations of species that are of moderate to high risk of infection with SARS-CoV-2 using a One Health approach. This guidance can also be used by animal keepers/handlers/owners/breeders, government officials, the private sector, and the general public.

Recommendations

1. Species targeted by this guidance

The information on susceptibility to infection by SARS-CoV-2 of animal species kept for food and/or fur production originates from experimental infection studies and from reports of natural animal infections. The situation is dynamic and new information can be expected which may require updates to this

guidance document. Thus, the information below is based on current knowledge as of 5th May 2021. The OIE regularly updates its [Technical Factsheet on infection of animals with SARS-CoV-2](#) which includes a table listing all animals for which information of natural and experimental infection is available. **Statements on “risk assessment” refer to transmission from human to animal, animal to human, and between animals and are based on current evidence arising from natural infection reports and experimental infection studies.**¹ There is no evidence that animals play a significant role in spreading SARS-CoV-2 to people. The risk of getting SARS-CoV-2 from animals is low for most individuals, but there is a higher risk for certain people including those working on mink farms.

Animals kept for food production

There are no reports of natural infections of the species mentioned below in the context of the SARS-CoV-2 pandemic.

Poultry: Experimental infections have been performed in chickens, ducks, and turkeys by different research groups. No indication of successful infection has been obtained in any of these experiments, indicating that poultry is not susceptible.

Risk assessment: negligible for human to animal, animal to human, and transmission between animals.

Pigs: Experimental infections have been performed by several research groups. Most of them found no indication of successful infection including virus propagation in the animal, whereas only one group using a higher infectious dose (10e6 TICD50/animal) found single animals positive for live virus, low level viral RNA and antiviral antibodies. Thus, pigs appear to have a low level of susceptibility, requiring a very high infectious dose to induce a low level of infectivity.

Risk assessment: very low for human to animal transmission, negligible animal to human transmission, and negligible for transmission between animals.

Cattle: One experimental infection study has been reported. Two of six infected cattle showed very low levels of viral replication followed by seroconversion. Thus, cattle appear to have a low level of susceptibility.

Risk assessment: very low for human to animal transmission, negligible animal to human transmission, and negligible for transmission between animals.

Animals kept for fur production

From the species mentioned below, natural infection with SARS-CoV-2 has only been reported in farmed mink. All the other statements result from data acquired through experimental infection studies.

Mustelids: Natural infection of farmed mink has been observed in several countries in Europe and North America. Other mustelids, such as ferrets and otters, have been shown to be susceptible too. Infection can be symptomatic (clinical signs and increased mortality) or asymptomatic in mustelids. Transmission from infected humans is considered the primary source of infection to these animals. Epidemiological analyses indicate instances of mink to human transmission in the Netherlands, Denmark, and Poland, and recent data suggest it might have occurred in the USA.

Risk assessment: High for human to animal transmission, moderate for animal to human transmission, and very high for transmission between animals.

¹ See references at the end of the document.

Raccoon dogs: Raccoon dogs have been found susceptible for SARS-CoV-2 infection in an experimental study. They propagate, excrete and transmit the virus. Although SARS-like viruses have been isolated from raccoon dogs in nature (11), there are no reports of natural infection of raccoon dogs in the context of the SARS-CoV-2 pandemic.

Risk assessment: High for human to animal transmission, moderate for animal to human transmission, and high for transmission between animals.

Animals kept for food and fur production

Rabbits: One experimental study demonstrated susceptibility of rabbits to SARS-CoV-2 infection including virus propagation and seroconversion when high virus titers (10e6 TICD50/animal) were used. However, markedly reduced (10e5) or no (10e4) susceptibility was observed after infection of animals with lower titer inoculum.

Risk assessment: Low for human to animal transmission, low for animal to animal transmission, and low for animal to human transmission

Other domestic and/or wild animals and pests (such as rodents, reptiles and birds) may be present in the farm setting. Although the risks related to these animals are briefly mentioned below, there is specific guidance covering these species available in the “Additional resources” section. FAO has published a [Qualitative exposure assessment of humans or animals to SARS-CoV-2 from wild, livestock, companion and aquatic animals](#), and the OIE has made available [Guidance Working with Free-Ranging Wild Mammals in the era of COVID-19](#).

2. Identification of risks associated with different farming systems

2.1. *Risk of introduction of SARS-CoV-2 infection from humans to farmed animals and other domestic animals*

The risk of introduction of SARS-CoV-2 on a farm is high when farmed animals of species that are of moderate to high risk of infection with SARS-CoV-2, as mentioned above, are exposed to infected humans. This is evidenced by natural outbreaks in mink in Canada, Denmark, the Netherlands, Greece, Italy, Latvia, Lithuania, Spain, Sweden, and the USA that were preceded by a history of COVID-19 in farm owners or workers. The infection spreads easily between mink within a farm and can spread to and from people with close contact to the farmed mink. The infection can spread between farms in close proximity, but direct human contact is still the only identified route of virus transmission (7). There are no known reports of the introduction of SARS-CoV-2 into other farmed species, which is in line with the susceptibility of animal species, as written above. It is however likely that farmed racoon dogs and rabbits are at some risk from introduction given their susceptibility to experimental infection. However, surveillance of farmed rabbits in the Netherlands has not found any serological or virological evidence of introduction or transmission.

Based on current evidence, the risk of introduction of SARS-CoV-2 from people to animals is high in mustelids, including mink and ferrets, and racoon dogs; low in rabbits; and negligible in other farmed livestock species. Consequently, the risks for farmed species other than mink and ferrets (and possibly racoon dogs and rabbits) regarding points 2.2. to 2.7. are considered negligible.

2.2. *Risk of transmission of SARS-CoV-2 between farmed animals and humans*

Epidemiological analyses indicate instances of mink to human transmission in the Netherlands, Denmark, and Poland, and recent data suggest it might have occurred in the USA. Transmission from infected mink to humans was demonstrated in the Netherlands (1) based on the onset of disease and similarity of the

virus genome sequence. In addition, 66 out of 97 people working on the first 16 infected farms tested positive by PCR, serology, or both. Viral RNA was found to be widespread, including in inhalable dust, and fur in infected mink farms. Virus could not be detected outside the mink farms in the environment.

In November 2020, the Danish public health authorities reported the detection of a mink-associated SARS-CoV-2 variant with a combination of mutations not previously observed (“Cluster 5”) in 12 human cases in North Jutland, detected from August to September 2020. Following public health measures implemented by Danish authorities, the incidence of COVID-19 in North Jutland decreased from 100 per 100,000 population in the week of 2nd November to 60 per 100,000 population in the week of 16th November. During the month of November 2020, Danish authorities conducted mass testing of 111 447 individuals in North Jutland using RT-PCR and have sequenced all positive samples. In November 2020, 349 cases were reported among people associated with mink farming, an increase from 200 cases in October 2020. Since June 2020, a total of 644 people associated with mink farming have tested positive. Furthermore, there have been at least 338 cases reported among people working with mink pelting, in six factories and two small facilities, which suggests that there is an increased risk of COVID-19 infection in people who are involved in farming, culling and pelting of mink (8).

[Data shared by the United States of America](#) suggests that mink to human transmission might have occurred in the country. Investigations found that mink from a Michigan farm and a small number of people were infected with SARS-CoV-2 that contained unique mink-related mutations. This suggests mink to human spread may have occurred. The animals on the farm have since tested negative for SARS-CoV-2 twice, and the infected people have since recovered. Finding these mutations in mink on the Michigan farm is not unexpected because they have been seen before in mink from farms in the Netherlands and Denmark and also in people linked to mink farms worldwide. Currently there is limited information available about the genetics of the SARS-CoV-2 virus that has infected people living in the communities near the mink farm. Thus, it is difficult to know with certainty whether the mink-related virus mutations originated in people or in mink on the farm. To confirm the spread of SARS-CoV-2 from mink to people, public health officials would need more information on the epidemiology and genetics of the virus in mink, mink farm workers, and the community around mink farms. These results highlight the importance of routinely studying the genetic material of SARS-CoV-2 in susceptible animal populations like mink, as well as in people.

The risk of SARS-CoV-2 transmission from infected farmed mink to humans in contact with the mink is high. The risk of SARS-CoV-2 transmission from infected mink farms to people living in the area neighboring the farm is negligible.

2.3. Risk of transmission of SARS-CoV-2 between farmed animals and other domestic animals

In the Netherlands 11 out of 99 cats on the infected mink farms (1) tested positive and the virus genome sequence was similar to that in the mink. No clinical signs were observed in these cats. In Denmark and the USA, a small number of dogs and cats from infected mink farms tested positive for the virus. Chicken, rabbits, and horses sampled on farms, and wildlife sampled in the vicinity of the infected farms in Denmark did not test positive for SARS-CoV-2 (7). **Consequently, the risk of SARS-CoV-2 transmission between farmed and domestic animals on infected mink farms is high for cats and dogs. In these settings, the risk of cats or dogs transmitting SARS-CoV-2 to humans is considered low.**

2.4. Risk of transmission of SARS-CoV-2 between different farms through movement of animals

The high (sero)prevalence of infected mink (2) in SARS-CoV-2 infected farms points to extensive replication and efficient transmission in farmed mink. **Consequently, the risk of SARS-CoV-2 transmission between farms through movement of live infected mink is high.**

2.5. Risk of transmission of SARS-CoV-2 between different farms through infected humans

In the Netherlands 66 out of 97 workers on the first 16 infected farms tested positive to SARS-CoV-2 (2). The genetic sequence of virus from the infected people was always similar to that of mink on the same farm. Moreover, infected mink farms of the same owner and/or sharing workers often, although not always, shared the same virus variant (2). **Consequently, the risk of transmission of SARS-CoV-2 between different mink farms through infected humans is considered high.**

2.6. Risk of transmission of SARS-CoV-2 between countries/regions through import/export of carcasses or products from infected mink

The OIE *ad hoc* Group on Safe Trade in Animals and Animal Products has made an assessment of the risk to human health posed by international trade in mink furskins². The Group concluded that:

- tanned or dressed mink furskins can be considered safe for international trade, as the standard processing or treatment applied to produce them should inactivate the pathogenic agent such that possible infection of a human or animal is prevented
- there is insufficient evidence to consider raw mink furskins as safe for international trade, and further research is needed to better understand any risk to human or animal health potentially posed by international trade in contaminated pelts or fur.

2.7. Risk of establishment of a reservoir of SARS-CoV-2 in farmed animals, domestic animals, and wild or feral animals

Because of SARS-CoV-2's apparent evolutionary origins in Horseshoe bats (Genus *Rhinolophus*) and reports of humans transmitting the virus to companion and zoo animals, precautions should be taken to avoid contact between farmed animal species and bats. Precautions should also be taken by humans when handling wild mammals, as described in the [Guidelines on working with free-ranging wild mammals in the era of the COVID-19 pandemic](#).

Once SARS-CoV-2 infection is present on a mink farm, it is difficult to ensure its elimination at farm-level. SARS-CoV-2 infections were reported to reemerge on a mink farm in Denmark after a decline in infection from a very high prevalence to an undetectable level (despite intensive surveillance) the virus was seen to reemerge in the same population of mink(9). In this occasion, the animals at the farm in question maintained high seropositivity against SARS-CoV-2 during the period of no detected infections, but this did not prevent them from being reinfected a few months afterwards (9). In Spain, two wild mink positive for SARS-CoV-2 infection were trapped on the field. These two animals had not escaped from a farm, but were part of a local population of wild mink (10).

Several species of mustelids and felids are susceptible to SARS-CoV-2 and may be capable of transmitting the virus amongst themselves and to other animals. However, their social structure (solitary or small groups) will somewhat reduce the possibility of establishing a virus reservoir in these species. **Consequently, in areas with a high density of mink farms or with stable populations of wild mink, there is a risk of establishing a reservoir of SARS-CoV-2.**

3. Risk pathways and risk reduction

Farms with populations of animal species that are of moderate to high risk of infection with SARS-CoV-2, (i.e., mustelids, felids, and racoon dogs) particularly in areas where community transmission of COVID-19

² [Report of the electronic consultations with the ad hoc Group on Safe Trade in Animals and Animal Products](#)

is ongoing, can consider implementing a comprehensive screening and monitoring strategy aimed at preventing the introduction of SARS-CoV-2 onto the farm.

Before an outbreak, animal and public health officials should consider offering education and guidance to farm operations on disease prevention principles and practices including worker safety, vaccination, use of PPE, and assessing risk pathways for disease introduction and spread. Farms should be strongly encouraged to develop farm-specific biosecurity plans that take into consideration the risk pathways listed below.

Biosecurity means a set of management and physical measures designed to reduce the [risk](#) of introduction, establishment and spread of animal diseases, [infections](#) or [infestations](#) to, from and within an animal population. In broad terms, it refers to anything designed to prevent the transfer of disease-causing pathogens. Biosecurity is crucial to control and contain the spread of SARS-CoV-2, as well as in the daily management practices protecting the health of people, including farm workers, and animals, both domestic and wildlife. To be effective, biosecurity measures need to be disease-specific, as well as site-specific.

A farm biosecurity plan sets out the steps to be taken to prevent introduction of SARS-CoV-2 into farms and the actions to control SARS-CoV-2 on a positive farm with a goal to protect farm workers, public and animal health. The plan should include, but is not limited to, controls on animal and animal product movement, movement of people, safe handling of vehicles, containers, and other associated materials that could serve as fomites, detailed plans for increased monitoring, detailed plans for disposal of dead animals, and detailed plans for cleaning and disinfection. Worker protection is crucial, and farms should consult with their health department to implement practices to minimize the risk of SARS-CoV-2 transmission between farm operators, workers, visitors, and others.

3.1. Introduction on the farm by workers or visitors

Introduction by workers or visitors is the most likely pathway for human-to-animal transmission on a farm. Recognizing this, all workers including farm owners should monitor themselves for signs of infection before entering the farm. People who operate, work on, or visit farms and who have symptoms of SARS-CoV-2 when they arrive at work or become sick during the day should immediately be separated from other workers, animals, and other people and be sent home. Anyone who develops symptoms should avoid contact with animals, including farmed and companion animals, and other farm personnel and stay at home until they have fully recovered. Vaccination of workers and appropriate PPE use would additionally reduce the risk of introduction of SARS-CoV-2 into the farms. Ty.

A system should be established to identify, monitor, and control individuals entering premises and to prevent the entry of unauthorized individuals. Access to farms should be limited to essential personnel and visitors e.g., feed and supply delivery. Signage should provide guidance to workers and visitors regarding the farm's biosecurity requirements.

The following measures are recommended to prevent introduction by workers or visitors:

- All personnel and workers should stay at home if they are sick or in the event they have been in contact with an individual infected with SARS-CoV-2, either for an isolation period or testing requirement as determined by national guidelines.
- Encourage workers to adhere to the WHO's advice on the use of masks and [other public health recommendations](#).

- All personnel and workers should be vaccinated against COVID-19. Encourage proper hand hygiene and provide employees with what they need to clean their hands.
- Restrict access to the premises and buildings where animals are kept.
 - Limit access to essential personnel only.
 - Limit non-production animal access, and implement measures to exclude domestic pets (dogs, cats, others), rodents, birds, and other wildlife from buildings.
- Provide and wear appropriate personal protective equipment (PPE) depending on the activity being performed. For example, increased PPE for working closely with animals including aerosol generating procedures (i.e. pelting, pressure washing pens, etc).
- Use fences, gates, and other barriers to control access of people and other animals to animal housing.
- Increase distance between workers who must be in a common area in accordance with [WHO guidance](#).
- Require visitors to park their vehicles in designated areas away from animal housing.
- Use signage to advise visitors to remain in their vehicles until farm personnel assist them and provide a phone number that visitors can call for entry instructions.
- Maintain a log of all personnel who enter the property (family, workers, visitors, etc.) including the date, contact information, information on previous contact with other animals, and nature of their visit.

3.2. Introduction of new animals onto a farm

New animals of species that are of moderate to high risk of infection with SARS-CoV-2, (i.e., mustelids, felids, and racoon dogs) brought to a farm are a potential risk, especially if no surveillance is being done on the origin farm. Introducing new animals of species that are of moderate to high risk of infection with SARS-CoV-2 may introduce disease onto a farm. Producers should consult with their veterinarian to design an appropriate isolation plan that may include testing new animal arrivals to protect the rest of their herd.

The following precautions are recommended to avoid introduction of SARS-CoV-2 into a new population of animal species that are of moderate to high risk of infection with SARS-CoV-2:

- All animals of species that are of moderate to high risk of infection with SARS-CoV-2 (i.e., mustelids, felids, and racoon dogs) which are destined to be brought into the herd or farm should come from farms that have never had SARS-CoV-2 cases and which have no signs of SARS-CoV-2 infection in people or animals involved with that farm.
- All animals in the shipment should be separated from the main herd and be managed separately at least 21 days before the shipment and a testing strategy for SARS-CoV-2 should be implemented at the time of separation to prevent mild/subclinical animals from bringing infection to the new herd.
- All animal mortalities that occur during isolation should be tested for SARS-CoV-2.
- The shipment may be introduced into the main herd only when the above measures indicate SARS-CoV-2 is not present.

3.3. Pests and roaming animals

Roaming animals can be domestic animals (e.g., cats and dogs), escaped or released animals (e.g., mink), as well as wild or feral animals (e.g., rodents, racoons, skunks and birds), which could potentially be responsible for passive transmission of SARS-CoV-2. **Based on the limited information available to date, the risk of these animals spreading SARS-CoV-2 to people is thought to be low. Roaming animals such**

as cats might, however, play a role in transmission between farms of moderate to highly susceptible species.

The following precautions are recommended to avoid introduction and/or transmission of SARS-CoV-2 to farmed animals of moderate to highly susceptible species by pests and roaming animals:

- Exclude all domestic animals (dogs, cats, etc.), as well as rodents, birds, and other wildlife (e.g., bats) from farm buildings, ensuring that the facilities are as pest-proof as possible.
- Farm operators should restrict access to their property and their animal housing areas and consider the use of traps inside buildings and within the property perimeter.
- Ensure proper safety and welfare precautions (and disposal options) are in place for handling trapped animals.

3.4. Feeding practices

Feed composition can present a risk when meat is used for production of raw feed, and its contamination occurs during or after processing, turning feed into a potential fomite. Inadequate storage of feed, e.g., in areas accessible to roaming animals and pests, and reuse of leftover food can increase the risk of feed contamination. **To date, there is no record of feed contamination with SARS-CoV-2.**

The following measures are recommended to avoid contamination of feed:

- Avoid feeding fresh meat to farmed animals. The use of processed feed is preferable to fresh meat and offal.
- Avoid repurposing food waste, human or other, to feed animals susceptible to SARS-CoV-2 infection without previous heat treatment.
- Maintain general hygiene of the premises where the animals are kept to avoid contamination. This includes pest control (e.g., prevent rodents, reptiles, birds and vermin) and regulating access of humans to animal feed and equipment through strict hygiene and decontamination protocols.
- Feeding systems must wherever possible be closed to ensure that feed storage and feed delivery systems are protected from access and contamination by wild birds, stray animals and rodents.
- Feed spills should be cleaned up without delay and feeding practices that could spread disease pathogens to susceptible species should be avoided e.g., do not refeed uneaten, potentially contaminated, rations or allow feed to remain where it could be consumed by susceptible animals.

3.5. Waste management

Proper management of farm waste, including carcasses and manure from infected animals, is imperative to reduce the likelihood of SARS-CoV-2 spread.

The following measures are recommended to avoid spread of SARS-CoV-2 through farm waste:

- Carcasses should be disposed of in compliance with local regulations. Local authorities/ordinances should always be consulted prior to disposal activities to assure compliance.
- Carcasses must be carefully transported to the approved disposal site to prevent contaminated material from escaping the transport vehicles. All vehicles should be cleaned and disinfected after each use. Onsite composting, onsite burial, incineration, landfill, and rendering, or a combination of these methods, are suitable options. The national competent authority should be contacted for advice, if necessary.
- Disposal of manure, debris, and feed. All manure and feed should be cleaned up and composted on site, if possible. If this is not possible, a system for hauling should be set up using covered

vehicles, to an approved site for burial, piling, or composting. The housing should be cleaned out and disinfected before spreading litter.

- The OIE Terrestrial Code [Chapter 4.13. on Disposal of dead animals](#) provides key considerations on disposal of animals that died as a consequence of a disease outbreak or that were killed in an effort to contain disease.

3.6. Cleaning and Disinfection

Frequently touched surfaces such as tools and workstations, shared spaces such as break rooms and locker rooms, and entry-points to the facility should be cleaned and disinfected on a routine basis.

The following measures are recommended in relation to cleaning and disinfection of premises to reduce the risk of SARS-CoV-2 spread:

- Putting in place practical biosecurity practices on the farm, including having dedicated boot disinfecting stations between farm areas.
- Using disinfectant products that are effective against SARS-CoV-2 and are appropriate for the surface: diluted household bleach solutions prepared according to the manufacturer's label for disinfection, or alcohol solutions with at least **60% alcohol**.
- Following manufacturer's directions for proper use and recommended PPE.
- Following national guidance and the [OIE Code Chapter 4.14. on General recommendations on disinfection and disinsection](#)

3.7. High-risk activities

To be effective, biosecurity measures need to be disease-specific, as well as activity specific. As several farm activities, such as vaccination, mating, weaning, pelting, and processing increase contact between humans and animals, they may increase the risk of exposure and potential spread of SARS-CoV-2. Production management and biosecurity practices should be reviewed and adjusted in these cases, in order to minimize the likelihood of exposure and spread of SARS-CoV-2.

Examples of risk mitigation measures include use of proper PPE, limiting the number and duration of human and animal interactions, and having a testing regime for humans and animals.

3.8. Material and vehicles

Vehicles' tires, caging, and other equipment can be contaminated with viruses and other microorganisms. People traveling between locations where animals are present should clean and disinfect these items between trips and before returning to their own farms. Sharing equipment, tools, or supplies with neighbours or other farms is discouraged. All premises, vehicles, and materials that come into contact with animals infected with or exposed to SARS-CoV-2 should undergo virus elimination procedures before restocking with new animals.

To accomplish cleaning and disinfection of material and vehicles, the following procedures are recommended:

- After use, equipment should be cleaned, disinfected, and inspected at the site to which the manure and litter was transported. In the case of inclement weather, the equipment may be cleaned, disinfected, and inspected at off-site wash stations.
- Cleaning of premises and materials. Cleaning and disinfection should be thorough to ensure that all materials or substances contaminated with SARS-CoV-2 virus, especially faeces, dried blood, and other organic materials, are removed from all surfaces.

3.9. Airborne transmission

Further studies are needed to understand the potential for airborne transmission of the SARS-CoV-2 virus in the farm setting. Ventilation systems used in production units/buildings should be assessed, and if possible modified to reduce the likelihood of airborne pathogen spread. In Denmark and the Netherlands, local spread among farms within a localised area is the only significant common feature.

3.10. Mutations

Mutations can make a virus strain more efficient in infecting/spreading through a population of farmed animals or change the pathogenicity and/or host range of the virus, but adaptation is not required for infection/transmission on a first instance. Mutations may also change the antigenic characteristics of a virus so that it may evade the immune response elicited by natural infection or vaccination. Therefore, continued monitoring and prevention should be undertaken by maintaining surveillance, outbreak investigation, laboratory diagnosis and early detection of pathogen mutations, whether they increase pathogenicity and transmission or not. Laboratories are encouraged to share isolates and to publish sequences to improve preparedness in other countries and regions.

4. Response following suspected or confirmed infection of animals and/or workers with SARS-CoV-2

Workers should be aware of how SARS-CoV-2 spreads, how to prevent getting infected, and be routinely reminded about biosafety and biosecurity measures against SARS-CoV-2 on the farm. Workers should inspect all animals of moderate and high susceptibility at least once a day for signs of illness to look for respiratory or gastrointestinal illness including any of the following clinical signs: coughing, dyspnea, lethargy, sneezing, nasal or ocular discharge, vomiting, diarrhea, and decreased appetite. Some OIE Members already have in place a surveillance plan to conduct active surveillance including testing of freshly dead animal carcasses. If this is not the case, it is recommended that such plan is implemented.

4.1. Suspected infection of animals

Infection of animals of species that are of moderate to high risk of infection with SARS-CoV-2, may be suspected due to: presence of workers sick with COVID-19, increases in animal mortality, animals off feed, clinical signs consistent with infection with SARS-CoV-2 in animals, or an alarm in the context of weekly/regular testing and surveillance of dead animals. At all times, workers should minimize contact with sick or dead animals. If infection of farmed animals is suspected, the following actions are recommended:

- Workers should increase the level of protection of the PPE being used when working with or near sick animals (see below).
- If an animal or group of animals are suspected to have SARS-CoV-2, or test positive for SARS-CoV-2, these should be immediately isolated from other animals.
- The number of people interacting with these animals should be kept to a minimum.
 - Workers that must have contact with these animals should wear respiratory protection (e.g. N95) instead of a cloth or surgical facemask.
 - Workers at higher risk for severe illness from COVID-19 should not work with animals suspected or confirmed to be infected with SARS-CoV-2.
- Workers should wash their hands with soap and water for at least 20 seconds after:
 - Having direct contact with animals, their food, or supplies, waste/faeces.
 - Cleaning up after animals, including any body fluids or waste.

- Leaving areas where animals are housed, even if not touching an animal.
- Removing PPE or mask
- Do not use compressed air and/or water under pressure for cleaning, or any other methods that might aerosolise infectious material.
- If there are people exposed to sick animals or sick people, the exposed person may need to self-monitor for temperature or symptoms for a period of 14 days post-incident.
- PPE should be used when cleaning or disinfecting a potentially SARS-CoV-2 contaminated area; follow the cleaning or disinfectant product manufacturer's instructions for use.

4.2. Suspected or confirmed infection of workers

Workers should be trained to know how to assess their health status. Workers' normal and required job training should be supplemented with additional training and information about COVID-19, recognizing signs and symptoms of infection, and ways to prevent exposure to the virus. Training should include information about how to put in place the various infection prevention and control measures, and they should be included in any infection prevention and control or COVID-19 response plan that an employer develops.

To efficiently detect suspected cases amongst workers, daily health checks should be conducted (e.g., symptom and/or temperature screening) before they enter the facility, following the guidance of the public health authorities and occupational health services. Should a worker present clinical signs consistent with COVID-19 or report having been in contact with a case of COVID-19, rapid testing and contact tracing are essential to contain a potential outbreak.

Workers that are suspected or confirmed to be infected with SARS-CoV-2 should stay away from the farm premises and the animals and isolate in accordance with the guidance of public health authorities.

4.3. Confirmed infection of animals

If infection in animals is suspected or confirmed, no movement of live animals, carcasses, or animal products should take place until further notice from animal health officials. The Veterinary Services should be informed and the strictest biosecurity measures that a farm allows should be implemented. Targeted testing would allow to determine the extent of the outbreak and to plan the next steps, such as separation into epidemiological units inside the farm. SARS-CoV-2 outbreak investigations should include collection of data on animal movement, movement of people and equipment on the farm, feed origin, management and feed sampling, and on the presence of wild or stray animals at the farm level. The decision to cull will depend on the national or regional capacity to contain the outbreak and to manage risks using less drastic measures, while managing welfare aspects. The national approach to the industry will also weigh on the decision to cull, as is the example of the progressive disappearance of mink farming for fur in the Netherlands. If a decision to cull animals is made, the OIE Terrestrial Code [Chapter 7.6. on Killing of animals for disease control purposes](#) should be observed.

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Additional resources

1. [Exposure of humans or animals to sars-cov-2 from wild, livestock, companion and aquatic animals: Qualitative exposure assessment](#) (FAO)
2. Standard Guidelines for the operation of mink farms in the United States [Book 3: Biosecurity Protocols for Mink Farms in the United States](#)
3. [FAO Biosecurity Toolkit](#)
4. Canadian Rapid Qualitative Risk Assessment (RQRA): SARS Coronavirus 2 (SARS-CoV-2) in Farmed Mink:

- 4.1. [English Link](#)
- 4.2. [French Link](#)
5. [Guidelines on working with free-ranging wild mammals in the era of the COVID-19 pandemic \(joint OIE, IUCN, SSC and WHSG\)](#)
6. [Response & Containment Guidelines: Interim Guidance for Animal Health and Public Health Official Managing Farmed Mink and Other Farmed Mustelids with SARS-CoV-2](#) (joint guidance from USDA and CDC)
7. [Interim SARS-CoV-2 Guidance and Recommendations for Farmed Mink and Other Mustelids](#) (joint guidance from USDA and CDC)