



Fur Farming, COVID-19 and Zoonotic Disease Risks

Executive Summary

Since April 2020, when the first case of COVID-19 in American mink was confirmed on a fur farm in the Netherlands, this zoonotic disease has continued to rage throughout farmed mink herds in various EU Member States as well as in the United States and Canada. In some countries, this has led to the preventative culling of millions of animals; while, in others, the government authorities have only required the implementation of biosecurity measures to try to prevent further transmission.

As this white paper will outline, the wisdom of not taking measures to eradicate potential reservoirs of SARS-CoV-2, the virus that causes COVID-19, has been brought into question by the discovery that this coronavirus can jump back and forth between mink and humans. Viral genome sequencing has shown that infection in mink can lead to dangerous mutations of the spike-proteins which, if transmitted to human populations, could potentially undermine the efficacy of the vaccines that are needed to end this global coronavirus pandemic.

Fur farming thus poses a serious risk to human health. This is the key reason why Denmark has taken the radical step of culling its entire mink herd after a quarter of its 1147 fur farms were found to

have been affected. It is also why the Netherlands forced an early shutdown of its industry, which was already due to be phased-out by 2024.

Additionally, the outbreaks of COVID-19 on mink farms have drawn public attention to the fact that fur is produced - solely to supply the frivolous needs of the fashion trade - by intensively confining wild animals in small wire cages in close proximity with one another. Factory farming mink and other fur bearing species is an inherently inhumane practice.

Animals on fur farms suffer from chronic stress and poor welfare, which can compromise their immune responses. Mink, in particular, are susceptible to respiratory diseases and SARS-CoV-2 has spread virtually unbridled in this cruelly farmed species.

The present paper charts the spread of COVID-19 in mink. It explores the relationship between the intensive confinement of wild animals for fur production and the risk of zoonotic disease. Given the animal suffering and public health risks posed by this non-essential industry, Humane Society International strongly advocates a permanent end to breeding, keeping and killing animals for the purposes of fur production.

Introduction

On 31st December 2019, China notified the World Health Organisation (WHO) of the emergence of a deadly new coronavirus, which was given the name SARS-CoV-2. Within a mere couple of months, a global pandemic ensued as this zoonotic disease (i.e. a disease that is transmissible between animals and humans) began to spread across the world.

COVID-19, as the disease caused by SARS-CoV-2 became known, has not only led to millions of human infections and over 4.8 million deaths,¹ but has also had a devastating impact on the economy

and people's everyday lives, since it has ripped through the very fabric of human society.

The emergence of this novel coronavirus has also raised serious questions about the impact of human interactions with and exploitation of other species. During the initial outbreak, most human cases were traced back to a wildlife market in the city of Wuhan, Hubei province, China. SARS-CoV-2 is thought to have originated in bats and may have passed through an (unknown) intermediate animal host animal before acquiring the ability to infect people.^{2,3}

This is not the first, and will undoubtedly not be the last, newly emerging pathogen to jump the species divide and cause disease in human populations. In recent years, we have borne witness to outbreaks of severe acute respiratory syndrome (SARS), Ebola, Middle East respiratory syndrome (MERS) and the highly pathogenic avian influenza (HPAI) in humans.

While a small fraction (less than 14%) of all recognised human pathogen species are viral (others are bacterial, fungal, prions etc.), almost 75% of newly discovered pathogens have been viruses,⁴ including the 2020 COVID-19 pandemic. Indeed, a systematic review published in 2015 found that 91% of zoonotic viruses can originate from wildlife, 34% can originate from domestic animals, and 25% may originate from both wild and domestic species.⁵ Transmission goes both ways and people can spread disease to animals as well,⁶ for example human influenza A viruses can infect pigs.^{7,8} Given their close proximity, humans share more viruses with animals kept for production purposes than with wildlife.⁹

The present report will examine the potential zoonotic disease risks posed specifically by intensively exploiting animals for the purposes of fur production. It will explore how keeping animals

on fur farms - under inherently poor animal welfare conditions - can lead to these animals serving as immediate, intermediate, or amplifier hosts for viral pathogens with a pandemic potential. One of the greatest concerns is that keeping animals of a very similar genotype in close proximity to one another under poor animal welfare conditions is a recipe for disaster.

As outbreaks of COVID-19 on mink farms in both Europe and North America have clearly demonstrated, it is possible for viral pathogens to jump back and forth between humans and animals bred for fur. Mustelid species appear to be particularly susceptible to respiratory diseases, which partly explains why farmed mink were vulnerable to infection with the SARS-CoV-2 virus.

The outbreaks of COVID-19 among mink herds has not only led to the preventative culling of millions of mink since the first case was identified in the species in the Netherlands in April 2020, but has also raised serious concerns about the existence of a reservoir of SARS-CoV-2 and genetic mutations in the virus as a consequence of infection in mink could affect our ability to halt the spread of and eliminate the disease and may undermine the efficacy of any future vaccine. This will be further discussed below.

Species kept for intensive fur production

The vast majority of commercially produced animal fur today comes from wild animal species that are intensively bred and killed on farms. American mink (*Neovison vison*), red fox (*Vulpes vulpes*), Arctic fox (*Alopex lagopus*) - as well as bred hybrids of these two fox species - raccoon dogs (*Nyctereutes procyonoides*) and chinchillas (*Chinchilla chinchilla*) are the main species that are commercially exploited for their fur.

The aforementioned species are wild animals, even chinchillas only started to be deliberately bred for fur in the 1920s.¹⁰ Contrary to fur industry claims, American mink, fox and racoon dogs are not domesticated animals, certainly not in the same way as other farmed species, such as cattle, pigs, sheep and poultry species, which are all herd or flock species that have undergone a few thousand years of selective breeding. In comparison, fur-bearing species have only been kept and bred in captivity for a relatively short space of time.

Although these animals were long hunted and trapped for their luxurious pelts, it was only during the mid-nineteenth century that the first attempts to breed captive animals for fur began in North America. American mink were deliberately bred from the 1860s onwards, while foxes are believed to have been first confined to farm cages in 1895 in Canada.¹¹

Fur farming only began in Europe during the 1930s, primarily exploiting species that had been imported from the Americas. Some of these species, such as muskrats and coypu, failed to sufficiently thrive and/or produced poor quality fur in captivity and many individuals were subsequently released into the wild. Populations of these non-native species were able to establish themselves and they are now commonly regarded as invasive alien species given their impact on native biodiversity and the economic damage that they are deemed to cause.^{12,13}

For a long time, selective breeding of fur-bearing animals was focused primarily on the pelt quality, physical size and producing colour variations, rather than necessarily on the behavioural traits that would better enable them to cope with life in captivity. While mink, foxes and raccoon dogs kept on farms do differ in some respects to their wild conspecifics, these species all retain very strong desires to range, dig, forage for food and engage in social and breeding behaviour. In the case of mink, this species has additional needs to access water for swimming, hunting prey and to regulate their body temperature.

The relatively short period of time that these species have been farmed, has led animal welfare experts to conclude that “it [is] highly unlikely that all of their requirements for good welfare in captivity will have been identified”.¹⁴ Below the impact of poor animal welfare will be discussed in greater detail.

In addition to the aforementioned species, in the past, another mustelid species, namely ferrets (*Mustela putorius furo*) - the domesticated variant of the European polecat - were also bred for fur and were referred to as ‘fitch’ specifically for this purpose.¹⁵ Ferret farming has never been a widespread activity, probably because breeding these animals for the pet trade is more lucrative,

and it is not known whether ferrets are still being kept and killed for their fur.

Coypu (*Myocastor coypus*), a South American rodent species also known as nutria, and muskrats (*Ondatra zibethicus*), which are native to North America, were also once bred for fur, but – as noted above - these two rodent species did not reproduce well in captivity.

Further to this, some breeds of the domesticated rabbit (*Oryctolagus cuniculus domesticus*), such as Rex and Orylag rabbits, are also commercially bred primarily for their pelts, which strongly resemble chinchilla fur. Their meat is a secondary product.

It should, however, be noted that most rabbits bred on European farms for meat are from completely different breeds, such as the Californian white and New Zealanders. Their pelts are not commercially interesting to the fur industry given that the animals are generally slaughtered when they are moulting and their pelts are not homogenous.¹⁶ Rabbit furskins are, therefore, generally considered to be a waste product in the European rabbit meat industry, which are either disposed of, or used as a material in the felt-making industry where they are used for making high-quality felt hats.

Animal welfare problems inherent to fur farming

The most commonly farmed fur-bearing species, mink and fox are carnivorous predators and are highly inquisitive, active animals with complex social lives. As noted above, unlike most other types of farmed animals, which tend to be flock or herd species, mink are solitary by nature. Mink and fox are both territorial species and, in the wild, go to great lengths to defend their territories. As will be further outlined below, these animals are unsuited to farming conditions and especially intensive breeding and rearing.

Mink farming

In the wild, mink are extremely active and solitary animals, strongly motivated to range over large territories of several kilometres, to hunt by following scent trails, and to create, live in and investigate dens and burrows. As semi-aquatic mammals their territories include lakes and rivers, where they carry out key behaviours including swimming and diving for prey.¹⁷

The life that mink are condemned to on fur farms stands in stark contrast to this. The excessive energy of these animals is confined to cages and nest boxes typically measuring 90x30x45cm. Being naturally solitary animals, the stress of being forced to live in cages with siblings, without access to water for swimming, and next to neighbouring cages with completely unrelated mink, often leads to fighting, injury, instances of cannibalism and death.^{18,19,20}

Stereotypical behaviour (such as pacing along the cage wall, repetitive circling/nodding of the head, etc.) and auto-mutilation (i.e. sucking or biting of the animal’s tail fur, or other parts of the pelts) is routinely observed in farmed mink. These unnatural behaviours provide a strong indication of stress and poor animal welfare.^{21,22,23,24}

Fox farming

Wild foxes can have a home range of 20-30km², and can migrate over hundreds of kilometres

seasonally. Their habitat is rich and varied, allowing for key behaviours including hunting, territory establishment and den building, socialisation and mating. By contrast, foxes on fur farms live in battery cages of a typical size of 0.8-1.2m². This space can in no way be described as meeting these animals' physiological or behavioural needs.²⁵

These battery cages are barren with the exception, in some cases, of a wire shelf and/or an item for gnawing. The persistent lack of meaningful and varied stimulation and opportunity to practice normal behaviours often leads to stereotypical behaviours, repetitive movements that are indicative of a compromised mental state.²⁶ Injuries also occur as a result of fighting with cage mates, which is also a consequence of the stress of confinement.²⁷

Fur industry attempts at 'humane-washing'

In recent years, the fur industry in Europe has been keen to maintain that it is working to improve the welfare of animals on fur farms. To these ends, they have established the WelFur scheme.³¹ This is an industry-led voluntary welfare certificate for fur farms, which in reality requires lower standards than the law in some EU Member States.

The truth is that the intensive battery cage systems that are found on fur farms in the EU have remained largely unchanged over the years. The WelFur programme, which is designed around the current housing systems and current minimum levels of European Union legislation (i.e. Directive 98/58/EC on the protection of animals kept for farming purposes and Regulation (EU) 1099/2009 on the protection of animals at the time of killing), offers neither satisfactory nor reliable solutions to the inherent animal welfare problems associated with fur farming.

For example, the WelFur criteria do not require access to swimming water for mink or sites for digging for foxes. As the ability to search for food in water (mink) and to dig (fox) are to be considered as natural behaviours and the motivation to carry out such behaviour probably is high, the WelFur criteria for the species in question do not meet their specific physiological and behavioural needs³².

In addition, the WelFur evaluation scheme combines different welfare measures into an

Welfare problems have also arisen in fox from the fur industry's selective breeding animals to favour large body size and loose skin. In the wild, arctic foxes weigh in the region of 3kg. On fur farms they are reported to weigh in excess of 20kg – over six times the species' natural size²⁸. This is done to increase the fur yield per animal, but it is important to note two undesirable consequences of this breeding.

The first is that these grossly overweight animals frequently suffer from a variety of long-term health problems, including infections at the site of skin folds, in particular around the eyes; deformed or 'bent' feet, and difficulty in moving around²⁹. Secondly, while selective breeding has increased the size of fox, the cage sizes have remained the same, giving the overall result that over time these animals are being afforded less and less space, relative to their size³⁰.

overall score for a farm. This practice obscures individual measures and therefore allows serious welfare problems and injuries to be masked. The aim of its scoring system is to rank farms in relation to each other and against "current best practice".

The WelFur protocol does not assess animal welfare in relation to an "absolute" welfare level, nor does it assess animal welfare on an individual animal level. The WelFur framework is not designed to provide reasonable assurances that individual animals will not suffer from poor welfare.³³

Over the past few decades, the conditions on fur farms across the globe have been documented by animal protection organisations. Time after time this film footage shows the same kind of animal welfare problems that the industry claims it has been actively solving in the framework of the WelFur programme.³⁴

Even the most recent images captured on European fur farms, which purportedly comply with fur industry welfare standards, reveal animals displaying stereotypical behaviour, self-mutilation, cannibalism, untreated wounds and so forth³⁵. The conclusion that can be reached is that the fur industry's voluntary welfare standards are not only inadequate, but may also be viewed as tantamount to 'humane washing'.



Failures to achieve the 'Five Freedoms' for farm animal welfare

On the basis of veterinary analysis of footage from fur farms in Europe, HSI has concluded that the conditions under which fur-bearing species are kept do not even allow the basic 'Five Freedoms' for farmed animals to be met.

These five freedoms also form the basis for the World Organisation for Animal Health's (OIE) guiding principles on animal welfare, and are also codified as welfare needs in EU legislation, namely in Directive 98/58/EC on the protection of animals kept for farming purposes, as well as the Council of Europe's 1999 Recommendations Concerning Fur Animals.³⁶

It should be noted that these Five Freedoms are today viewed by animal welfare scientists as the most basic obligations of those who keep animals, yet fur-bearing species kept on fur farms in intensive battery cage systems are not afforded even these freedoms, nor could they be said to have "a life worth living".

In October 2018, HSI and Finnish organisation Oikeutta Elaimille conducted an investigation on two Finnish fur farms, which have been certified by the European fur industry body as having 'high welfare'. Documentary evidence of the living conditions and the observable physical condition and behaviour of both mink and foxes was recorded and later subjected to veterinary analysis, which focused on the five freedoms and the implementation of Directive 98/58/EC. Table 1 provides an overview of the key findings.³⁷

There is no doubt that there is clear evidence from this footage, of supposedly 'high welfare' certified farms, that none of the Five Freedoms are being met consistently. By implication therefore, the conditions are highly likely to contravene the guiding principles of the OIE, the European Directive 98/58/EC Concerning the Protection of

Animals Kept for Farming Purposes, as well as the Council of Europe's 1999 Recommendations Concerning Fur Animals.

This – and other fur farming footage – has also been analysed with respect to violations of EU Directive 98/58/EC concerning the protection of animals kept for farming purposes. This legislation lays down minimum standards for the protection of animals bred or kept for farming purposes, including for fur production.

Article 4 of the Directive states: 'Member States shall ensure that the conditions under which animals (other than fish, reptiles or amphibians) are bred or kept, having regard to their species and to their degree of development, adaptation and domestication, and to their physiological and ethological needs in accordance with established experience and scientific knowledge, comply with the provisions set out in the Annex.'

Based on the available scientific literature around the physiological and behavioural needs of fur farmed animals, HSI concluded that the fur farms studied do not meet the requirements of Article 4, most notably in relation to: a) the inadequate size of the cages; b) the lack of non-wire substrate to allow for key behaviours such as digging; and c) (in the case of naturally solitary and semi-aquatic mink) the lack of provision of water for swimming and lack of opportunity for animals to withdraw meaningfully from the presence of other animals.

Likewise, we found additional failures to comply with the terms of the legislation. For example, injured animals were evidently not being cared for appropriately, or placed in isolation with dry bedding as required by clause 4 of Directive 98/58/EC.

Table 1: An analysis of five freedoms on Finnish fur farms

The Five Freedoms		Key observations on animal welfare
1	Freedom from hunger and thirst, by ready access to water and a diet to maintain full health and vigour.	Many of the foxes in the footage are grossly obese as a result of being fed a diet in excess of their nutritional needs, particularly in relation to their close confinement in small cages. In addition, these animals are likely to suffer from numerous health conditions caused by their unnatural weight.
2	Freedom from discomfort, by providing an appropriate environment, including shelter and a comfortable resting area.	It is clearly apparent that the animals on both farms are kept in completely inadequate conditions for their species. The dirty dusty cages allow only minimal freedom to express many of their normal behaviours and give no opportunity to escape aggressive encounters with cage mates resulting in the severe wounds seen in the footage. Housing on wire floors, ubiquitous throughout the fur farming industry globally, will cause discomfort and pain. There is little if any sign of enrichment to provide even the most basic mental stimulation for these highly active and inquisitive species.
3	Freedom from pain, injury and disease, by prevention or rapid diagnosis and treatment.	There is ample evidence of frequent aggressive encounters resulting in severe wounds, such as the mink with an extensive bite wound involving loss of skin from much of its back and tail base. The wound was exuding serum and was grossly contaminated with bedding suggesting it had never been cleaned, dressed or protected. There is evidence of animals with eye infections, missing eyes, damaged or missing ears, and a fox with a large open wound on its side. Any injuries should require the swift removal of the animals from their cage to an isolation area and the provision of immediate veterinary treatment, there is no evidence of this having taken place. All of the arctic foxes are grossly overweight or obese which will undoubtedly cause a number of secondary conditions and poor health, such as those seen in the footage and including excessive skin folds, eye infections, and excessive weight on joints, leading to “bent” or deformed feet.
4	Freedom to express normal behaviour, by providing sufficient space, proper facilities and appropriate company of the animal’s own kind.	The small battery-style cages offer little opportunity for the animals to express even a minimum amount of their natural behaviour, which they will have a strong desire to do. Being housed in inappropriately close confinement with other animals has resulted in aggression leading to severe wounds and even death, as seen in the footage.
5	Freedom from fear and distress, by ensuring conditions and treatment which avoid mental suffering.	All the animals seen in the footage were living in dismal, cramped conditions, many in fear of aggression from cage-mates with little opportunity to engage in activities that they have a strong desire to carry out. They clearly do not lead lives worth living.

Poor animal welfare increases susceptibility to infectious disease

As illustrated above, the living conditions in fur farms, which keep animals in close proximity and at high densities, fail to satisfy many of the animals’ most basic welfare needs.

Not only are these captive wild animals highly stressed and thus immunocompromised, but they are crowded into close contact with each other’s respiratory secretions and excrement.

Fur farms also often lack naturally mitigating factors, such as genetic variability and healthy

distance between animals. The animals are confined to small wire cages with bedding materials – as well as dried faeces that accumulate under the cages - that also generate a lot of dust.³⁸

For these reasons, fur farms provide ample potential channels for diseases to propagate from one animal to another, and conditions in which viruses may genetically recombine into forms potentially virulent to humans.³⁹

There is also already an unacceptably high level of mortality among animals kept on fur farms. This poses the risk that mortality due to infectious disease may not necessarily be detected.

The high density of animals on fur farms also means that it is difficult for workers to frequently monitor the health status of individual animals. Animals suffering from the symptoms of infectious diseases may, therefore, go unnoticed.

COVID-19 outbreaks on mink farms

On 26th April 2020, the first case of SARS-CoV-2, the virus that causes COVID-19, in American mink was confirmed on two Dutch fur farms in Noord Brabant, a province that lies not only at the heart of the Dutch mink production industry, but also – at that point in time – at the epicentre of the COVID-19 outbreaks in the country.⁴⁰

Since this initial outbreak, SARS-CoV-2 has continued to rage throughout farmed mink herds in various EU Member States. To date, the virus has been detected in mink on a total of 444 farms: 290 mink farms in Denmark, 69 in the Netherlands, 14 in Sweden, 24 in Greece, 16 in Spain, 2 in Italy, 1 in France, 4 in Lithuania, 3 in Poland and 1 in Latvia. SARS-CoV-2 has also been detected on 17 fur farms in the US States of Utah, Wisconsin, Michigan and Oregon and on 3 in British Columbia, Canada. At the same time, almost 20 million mink have been ordered to be killed on public health grounds, including 17 million animals in Denmark and a further two million animals in the Netherlands.

Spill-over from infected farmed mink to humans has so far been confirmed in Denmark, the Netherlands, Poland, Sweden, and potentially also the United States^{41,42}.

It is noteworthy that these outbreaks on fur farms have persisted despite the mandatory and strict biosecurity measures supposedly having been taken by fur farmers to prevent the further spread of COVID-19 among their herds. Outbreaks have continued throughout the annual cycle, occurring during the breeding season when the number of animals present is greatly reduced (after the killing season but before the new pups are born) and also during the pupping season when the mink population increases approximately five-fold.

As will be illustrated below, the competent national authorities of each country whose fur farms have been affected by COVID-19 have varied significantly in their approach to stamping out the virus in mink.

COVID-19 surveillance and testing regimes

The European Commission published Implementing Decision (EU) 2021/788 laying down rules for monitoring and reporting infections with SARS-CoV-2 in certain animal species (namely mink and raccoon dogs) on 12th May 2021⁴³ but it is unclear what testing and screening regimes are or have been in place for mink in fur producing countries outside of the European Union, or for fur farm workers.

In Europe, it was only after the publication of the European Centre for Disease Prevention and Control's (ECDC) *Rapid Risk Assessment: Detection of new SARS-CoV-2 variants related to mink* on 12th November 2020⁴⁴ that recommendations were made to EU Member States with regard to testing regimes. The ECDC report will be discussed further below.

With respect to testing regimes, the COVID-19 crisis in the fur farming sector has also highlighted that countries and federal states do not necessarily know exactly how many fur farms there are within their borders.

For example, in mid-October 2020, the Danish Veterinary and Food Authority gave a figure of 1137 mink farms on their website, while a month later the number had increased to 1147.⁴⁵ Likewise, the Swedish authorities do not seem to know just how many fur farms there are still in existence there with the total varying between 34 and 40. It is also not known exactly how many fur farms there are in the US or their precise locations.

This raises serious concerns about the ability of the competent authorities to effectively implement a COVID-19 surveillance programme, let alone carry out animal welfare checks on mink farms throughout the production cycle and at the time of killing.

Jumping back and forth across the species divide

It has become evident that SARS-CoV-2 is capable of jumping back and forth between humans and mink, and that the virus is able to mutate in mink prior to re-infecting people⁴⁶. Farm workers

infected with COVID-19 appear to be the initial source of infection in mink herds. However, a number of recent cases in Spain indicate that all the farm workers had been vaccinated and had tested negative for the virus⁴⁷.

Mustelid species, such as mink, seem to be particularly susceptible to the virus. One of the features of SARS-CoV-2 is that it directly targets the cells of the respiratory systems of mink, just as with people.⁴⁸

As a result, symptomatic, sick mink most likely will experience severe respiratory distress before dying. This also makes COVID-19 infection an animal welfare problem and, as noted above, the welfare of animals on fur farms is already poor and immune systems suppressed as a result of chronic stress.

Developments in the Netherlands

Nearly three million mink have already been preventatively culled as a result of SARS-CoV-2 being detected on fur farms in the Netherlands.

As noted above, the Netherlands was the first country to confirm the outbreak of COVID-19 in mink. Fur farms are largely concentrated in one part of the country, primarily in the province of North Brabant and just across the neighbouring borders of Limburg and Gelderland. These areas are more generally characterised as having a high density of intensive animal production.⁴⁹

There were still 128 mink farms registered in the Netherlands at the outset of the outbreak. Many of the operations affected by COVID-19 were large farms with between 4000-12,000 (or more) breeding females on site. With an average mink litter of approximately 5 kits, this means that over 60,000 mink were likely culled on some farms.

All mink on affected fur farms have been swiftly killed and a rapid warning system, requiring farms to regularly submit cadavers for testing, established to identify possible new cases. A ban on the transportation of live mink was also enacted to prevent further transmission. After more than forty cases had occurred, Parliamentary resolutions calling for an industry shutdown,⁵⁰ calls from regional safety boards⁵¹ and steadily growing public health concerns, the Dutch government finally decided to effectuate the early closing of the mink sector, which was already being phased-out due to a ban that would have fully entered into force on 1st January 2024.⁵² On 8th

December 2020, the Agriculture Minister announced that the last mink on the remaining Dutch fur farms had been killed for their pelts bring the sector to a permanent end.⁵³

One of the key reasons that precipitated this political decision to shut down the industry ahead of the original phase-out deadline were the findings of scientific research into the Dutch mink farm outbreaks. Using whole genome sequencing to investigate outbreaks on 16 fur farms, the researchers found that, after the detection of SARS-CoV-2 on mink farms, 66 of 97 (67%) persons (occupationally) associated with these farms tested were shown to be infected with SARS-CoV-2.⁵⁴

Crucially, genetic analysis showed that the variant of SARS-CoV-2 virus was the same as those found in the mink, and were not identical to those found in unrelated SARS-CoV-2 patients living in the vicinity of farms.⁵⁵

The Outbreak Management Team-Zoonoses, which was responsible for monitoring the COVID-19 outbreak in the Netherlands and advising the government, deemed the continued existence of mink farms too great a risk.⁵⁶

It has also been unclear just why the virus continued to spread rampantly among the Dutch mink herd after the mandatory implementation of strict biosecurity measures and the preventative culling of animals on infected farms from the outset of the outbreak.

Researchers exploring the modes of transmission between farms were uncertain whether SARS-CoV-2 continued to spread due to environmental factors, intermediate hosts (e.g. wild animals or escaped mink), the susceptibility of specific mink breeds, or human failings (e.g. not wearing the proscribed protective clothing, etc.).⁵⁷

Indeed, it even led politicians to speculate whether the virus was being spread deliberately by fur farmers to get financial compensation.⁵⁸ The recent fall in pelt prices did indeed mean that producers may receive more for their culled mink than they would probably have done for the pelts at auction.

Developments in Denmark

There are more than 1000 mink farms in Denmark, predominantly located in the north of the country. It is a small nation with a population of 5.83 million

people, but which produces around 17 million mink pelts per annum.

COVID-19 was first detected on a Danish mink farm in North Jutland in June 2020.⁵⁹ The animals on this and the next two affected farms were preventatively culled, but the competent authorities decided to cease culling after the third farm and instead rely on strict biosecurity measures.⁶⁰

This decision was later reversed when, by 1st October 2020, the disease had rapidly spread to dozens more farms bringing the total to 41. Two weeks later, the number of mink farm infections in Denmark had risen to 76 according to the interactive map updated daily by the Danish Food and Veterinary Administration.⁶¹ The continued spread of the virus indicates that biosecurity measures were insufficient to prevent further transmission of the disease.

A cull of mink on around 100 of the 1147 Danish fur farms, primarily in the north of Denmark, was set in motion in early October with animals on farms within a 7.8km radius of COVID-19 positive ones also being killed.⁶²

It was at this point that experts from the State Serum Institute noted that fur farmers had a greater risk of contracting COVID-19 than doctors and nurses.⁶³

The numbers of Danish fur farms where SARS-CoV-2 had been detected continued to rise daily. On 21st October 2020, the Danish Food and Veterinary Administration stated that animals had to be killed on 250 farms, which corresponds to approximately every fifth farm and meant that about three million mink would be culled.⁶⁴

Matters escalated a few weeks later when a new mink variant of the SARS-CoV-2 virus was detected. It was feared that this Covid-19 mutation moving from mink to humans could jeopardise future vaccines.

In short, the genetic mutations found – and dubbed Cluster 5 – alter the spike protein, enhancing the ability of the virus to bind to the ACE-2 receptors; the interaction between the virus spike protein and ACE-2 is an important first step for SARS-CoV-2 infection. The vaccines under development focus on making antibodies to block the interaction of these very spike-proteins.⁶⁵

It became known that 12 people in northern Denmark had already been infected with this dangerously mutated virus. Half of 783 infected people in this region, where many fur farms are situated, had been found to have had infections stemming from the mink farms.⁶⁶

In response to these findings, on 4th November 2020, the Danish government announced the radical step of culling all mink on the remaining fur farms and a temporary ban on mink production in the country.⁶⁷ With a population of up to 17 million farmed mink, this highlights the enormity of the problem and the need to take decisive action to eliminate the reservoir of SARS-CoV-2 and potentially dangerous mutations of the virus.

The Danish Food and Veterinary Administration ultimately detected SARS-CoV-2 in a total of 290 out of the 1147 mink farms in Denmark; this is around 25% of all the producers. These were all situated in the north of the country in municipalities close to North Jutland where the virus was first detected in mink.⁶⁸

In January 2021, the Danish government reached a political agreement with regard to a compensation scheme for mink producers.⁶⁹ On 7th April 2021, the European Commission announced that it had approved under EU State aid rules, the €1.74 billion (DKK 13 billion) Danish scheme to compensate Danish mink farmers and mink-related businesses for measures taken in the context of the coronavirus outbreak. This included a budget of approximately €538 million (DKK 4 billion) to support those willing to give up their production capacity to the State.⁷⁰

In the Preliminary report of an outbreak of SARS-CoV-2 in mink and mink farmers associated with community spread in Denmark, published on 4th February 2021, Larsen et al state that “Overall, 643 of 3,319 (19%) people identified as being connected to mink farms became infected” and that “Approximately 4,000 human cases were estimated to be infected with a mink variant.”⁷¹

To date, the future of the Danish mink industry remains uncertain. It is not yet known how many mink producers have decided to take up the option of permanently ending their activities, nor whether the remaining mink farms will be permitted to come out of ‘hibernation’ in 2022.

However, in June 2021, the Statens Serum Institut (SSI) published a health professional assessment of

the risk to human health in the event of a possible resumption of mink farming. It noted that the risk of infection between mink and humans is estimated to be reduced with infection surveillance and preventive measures, but is hardly eliminated as long as there is infection in the population. It concludes that reintroduction of a mink population in Denmark will therefore also be able to establish a zoonotic reservoir with future risk of infection with SARS-CoV-2 between humans and mink, as long as there is susceptibility in the population. The risk will *inter alia* vary with the size of a possible future mink population and the concrete organisation of mink production.⁷²

In September 2021, the Danish government announced it would extend its mink keeping ban for another year, until the end of December 2022.⁷³ The decision was taken after the Statens Serum Institut advised that the conclusions of its June 2021 risk assessment were still valid. That assessment stated that “keeping mink in Denmark after 2021 may entail a health risk for people of unknown size.”⁷⁴

Developments elsewhere in Europe

The enormity of the COVID-19 outbreaks on fur farms in both the Netherlands and Denmark have to some extent overshadowed the fact that this disease has also been found in mink elsewhere in Europe.

Spain

On 16th July 2020, the Spanish authorities announced that a mink farm in Teruel, Aragon had been infected with SARS-CoV-2, and all 92,700 animals on the farm would be preventatively culled.⁷⁵ There had already been suspicions of possible infections in May after 7 farm workers had tested positive for COVID-19.⁷⁶ In January 2021, it was confirmed that mink on two additional farms, one in Galicia⁷⁷ and one in Castilla y Leon,⁷⁸ had tested positive, in March an addition farm in Galicia⁷⁹ tested positive, bringing the total in the country to four. These outbreaks took place before the new breeding season had begun.

A series of twelve outbreaks have been confirmed on mink farms in the municipality of A Coruña, Galicia during the summer months of 2021, with the two most recent test-positive farms reported on 1 October 2021.⁸⁰ The vast majority of Spanish mink fur farms are located in Galicia and more than 50 percent of those farms have now tested positive for COVID-19. The susceptible animals on these farms number more than 200,000 females and

their young. The farms were “immobilised”, it is understood that mink are no longer culled on test-positive farms, as had happened in earlier outbreaks in Spain.

Initial reports from the first five farms in this series of outbreaks showed that in at least four cases all the farm workers were vaccinated and had also tested negative for the virus⁸¹.

In August 2021, Spain’s Ministry of Health issued new guidance advising double-vaccinated people who have come into contact with a COVID-19 positive person to undertake mandatory quarantine in cases where transmission from mink is suspected⁸², due to “the risk of possible mutations that are more transmissible associated with minks”⁸³.

Sweden

Sweden reported its first case of COVID-19 in mink on 23rd October after increased mortality in animals on a fur farm located in Blekinge county. Mink producers were subsequently asked to send dead minks to Swedish Veterinary Institute for sampling and analysis, but no preventative cull of the infected herd was recommended.⁸⁴

On 5th November, it was announced that an additional nine mink farms had been infected in the same area of Sweden where the initial case had been detected.⁸⁵ As of 1st December, a total of thirteen farms had been shown to be infected.⁸⁶

On 27th January 2021, the Swedish Board of Agriculture announced a ban on the breeding of mink on fur farms in 2021 and a ban on the movement of live mink, stating that “fur production can resume in 2022, provided that the pandemic situation allows it.” The decision followed a risk assessment by the Swedish Veterinary Institute and the Swedish Public Health Agency “based on the probability of new outbreaks, further spread and impact on public health.”⁸⁷

On 16th July 2021, the European Commission approved a €5.9 million scheme to support Swedish mink fur producers affected by the ban mink breeding.⁸⁸

Although thirteen farms had been identified as test-positive, further analysis of samples taken from twenty-six fur farms showed that mink on all but three of those farms had antibodies for SARS-COV-2.⁸⁹

A report by Sweden's leading animal and public health agencies reported that sequences taken from humans and mink on the same farms suggested "within-farm human-to-mink and/or mink-to-human transmission". It also stated that "The high animal density that is typically present in a mink farm, provides ideal conditions for viral replication and transmission, also increasing the risk of virus evolution" and pointed out that its surveillance had shown that the extensive spread within and between farms "occurred in spite of implemented biosecurity measures".⁹⁰

Although mink breeding is currently suspended in Sweden, breeding animals are still held on the remaining fur farms. A mink on one of those farms, this time in Västra Götaland, tested positive in August 2021. The complete genome sequencing shows that the detected virus "is of a type not previously seen in Sweden". The source of the infection is currently unknown, all farm personnel are reported to have either previously had the virus or been vaccinated.⁹¹

Italy

On 27th October 2020, it became publicly known that SARS-CoV-2 had been detected, with two positive samples, on a mink farm in Lombardy in August 2020. This fact was only revealed after the submission of an information request to the competent authorities.⁹² The OIE was notified only on 30th October.

On 10th November the regional health councillor for Emilia-Romagna, where two mink farms can be found, announced that the region will back a ban in front of the Ministry of Health.⁹³

On 11th November the Minister of Health notified the OIE the presence of a third positive sample from the same mink farm in Lombardy.

The Health Ministry issued an ordinance on 23rd November 2020 requiring the culling of animals on affected mink farms and the temporary cessation of breeding until February 2021.⁹⁴ Aside from forcing the fur farmer with an infected herd to kill his 26,000 animals (and affected farms in general), this legislative action was otherwise pointless given that the breeding season takes place in late February and March.

In February 2021, mink on a farm in Padua were reported as having tested positive for the virus, all

2,000 animals were due to be culled in April 2021.⁹⁵

On 25th February 2021 Italy's Ministry of Health issued an order suspending breeding on mink fur farms in Italy until 31st December 2021 and authorising the killing and destruction of all mink on farms where SARS-CoV-2 has been confirmed.^{96,97}

In March 2021, the Region of Lombardy asked the federal government to close mink farms to protect public health. At the same time it asked for compensation for the fur farmers.

Greece

On 11th November 2020, the Greek authorities announced that 10 workers and one farm owner had tested positive for COVID-19 in the municipality of Voio in Kastoria. Some dead animals were found on the farm, while others had symptoms.⁹⁸ Samples taken on the farm were found positive for SARS-CoV-2.⁹⁹

By 13th November, the culling of all animals on the infected farm had been ordered and a 'no-go zone' of 10km surrounding it implemented. All fur farm workers in Greece were ordered to be tested, leading to 9 workers on 4 other farms also testing COVID-19 positive.¹⁰⁰

Between 11th November 2020 and 14th February 2021, mink on 23 out of a total of 91 fur farms in Greece had tested positive for the virus.¹⁰¹ The authorities stopped culling mink after the first farm outbreak, biosecurity measures and regular testing of farm workers were introduced. The most recent outbreaks were identified in the early part of 2021 when the numbers of animals kept on the farms are at their lowest, before the new breeding season.

A further outbreak on another fur farm in Kozani was reported in August 2021, bringing the total number of outbreaks to date in Greece to twenty-four.¹⁰²

France

On 22nd November, mink were found to be infected with SARS-CoV-2 on one farm in Eure-et-Loire. Tests were ordered on the remaining three mink farms in France and all the animals on the affected farm were preventatively culled.¹⁰³

Lithuania

Lithuania also joined the litany of European countries affected by COVID-19 in mink on 26th November 2020 when the State Food and Veterinary Service reported infected mink and an infected worker on a fur farm in the Jonava district.¹⁰⁴

A second farm was identified, in the Radviliškis district, in December 2020, and another farm in the same district in March 2021. A fourth farm was also identified in March, in Lazdijų.¹⁰⁵

Poland

The Polish authorities only began testing mink farms for COVID-19 in November 2020 under vociferous protest from the mink farmers.¹⁰⁶

Independent tests carried out on a sample of 91 mink by researchers at the Medical University of Gdansk yielded 8 positive results for SARS-CoV-2.¹⁰⁷

Mink on a farm in Pomerania in northern Poland were confirmed as having tested positive for the virus in January 2021. This was later identified as the same farm from where positive samples were found by researchers from the Medical University of Gdansk.¹⁰⁸

In June 2021, an outbreak was confirmed on two mink farms, housing a total of 8,000 females and 29,000 young mink, at the same address in Lubelskie. All the mink were culled.¹⁰⁹

A scientific paper focussing on SARS-CoV-2 in farmed mink in Poland, published in September 2021, reported a “possible new genotype of SARS-CoV-2 that has sporadic mutations throughout the full genome sequence” and called for a country-scale biomonitoring program to be activated as soon as possible “to prevent the fur production sector from being a reservoir for future spillover of SARS-CoV-2 to humans.”¹¹⁰

Latvia

Latvia became the tenth European country to confirm an outbreak of SARS-CoV-2 in mink when a farm in the Lecava region was identified in April 2021. The report from the Latvian authorities to the World Organisation for Animal Health (OIE) notes that the farm held “around 64,000 breeding minks (all females) within a certain period of pregnancy. No clinical signs of COVID-19 observed in animals.”¹¹¹

In total, as of 8th October 2021, ten EU Member States have reported confirmed outbreaks of SARS-CoV-2 in mink on 424 mink farms. Denmark culled all its mink and introduced a ban on keeping and breeding mink up until 31st December 2021, now extended for one year to the end of 2022, Sweden and Italy have both suspended mink breeding during 2021. The Netherlands moved forward its mink fur farming phase-out period deadline from 2024 to 2021 meaning that mink production formally came to a permanent end on 1st January 2021.

United States

COVID-19 in mink has not been confined to fur farms in Europe. On 17th August 2020, the US Department of Agriculture’s Animal and Plant Health Inspection Service and National Veterinary Services Laboratories announced the first confirmed cases of SARS-CoV-2 in mink at two fur farms in Utah. The affected farms also reported positive cases of COVID-19 in people who were in contact with the mink occupationally.¹¹²

To date, SARS-CoV-2 has been found in mink on 16 fur farms in the US: 12 in Utah, 2 in Wisconsin¹¹³, 1 in Michigan¹¹⁴ and 1 in Oregon.^{115, 116}

No preventative culling has taken place on American mink farms; only biosecurity measures have been implemented.

Yet by the end of November 2020, reports to the World Organisation for Animal Health (OIE) showed that 16,130 mink on US farms had already died from coronavirus¹¹⁷. In Utah, the most badly affected US State, the State Veterinarian even downplayed the risk of the disease to human health. This is long after cases of direct transmission of COVID-19 from mink to humans had been confirmed in Europe.¹¹⁸

In December 2020, two separate incidents of wild mink testing positive for SARS-CoV-2 were confirmed in the United States. The first mink was found in Utah during surveillance for SARS-CoV-2 in wildlife around infected mink fur farms conducted by the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service¹¹⁹. The second mink was discovered as part of trapping surveillance by USDA Wildlife Services and Oregon Department of Fish and Wildlife near an infected farm in Oregon, it was believed to have “very recently escaped confinement”.¹²⁰

According to the United States Department of Agriculture (USDA), a mink premises was confirmed on its list of SARS-CoV-2 cases on 25th May 2021. The initial diagnosis was stated as virus neutralizing antibody, the state has not been identified and at the time of writing no other details are available.¹²¹

Canada

The first case of SARS-CoV-2 in Canada was confirmed by the National Centre for Foreign Animal Disease on a mink farm in British Columbia on 12th December 2020.¹²² Mink on a second farm in British Columbia tested positive for the virus on 24 December 2020.¹²³

In January 2021, eminent Canadian scientists issued a call for an end to fur farming in Province.¹²⁴ Their calls went unheeded as mink breeding resumed on British Columbia mink farms despite the COVID-19 outbreaks there.¹²⁵ On 6th April 2021, the Union of BC Indian Chiefs issued a call for a moratorium on fur farming in the province.¹²⁶

On 18th May 2021, the British Columbia Ministry of Agriculture, Food and Fisheries announced that SARS-CoV-2 had been detected on yet another mink farm in the Fraser Valley, the third outbreak

in the region. The farm was placed under quarantine with restrictions prohibiting the movement of animals and materials from the property, but there were no plans to cull the mink.¹²⁷

In July 2021 additional mink tested positive for the virus on a farm in the Fraser Valley that was still under quarantine after an outbreak in May 2021. Four animals were believed to have escaped their cages and were captured on-farm.¹²⁸

Later the same month, the Provincial Health Officer of British Columbia issued an Order, which capped the number of breeding animals, and forbade the acquisition of additional live mink and the establishment of mink farms by new operators. The Order cited a number of reasons for the action, including that “mink farming is a health hazard as it is an activity which endangers or is likely to endanger public health”; “there is a risk mink infected with SARS-CoV-2 could result in infection of workers at mink farms, which could lead to further transmission in human populations”; and “the susceptibility of mink to infection with SARS-CoV-2 creates a risk of development of variants of concern which pose a threat to public health and could undermine the efficacy of the COVID-19 vaccination program in British Columbia”.¹²⁹

ECDC risk analysis

As noted above, the European Centre for Disease Prevention and Control’s (ECDC) *Rapid Risk Assessment: Detection of new SARS-CoV-2 variants related to mink* was published on 12th November 2020.¹³⁰

The ECDC Rapid Risk Assessment unsurprisingly concludes that the greatest risks posed by SARS-CoV-2 are to those working occupationally with mink or living in the communities close to mink farms, particularly if individuals are already medically vulnerable.

However, the report clearly recognises that the evolution of the virus in mink has potential implications for COVID-19 diagnosis, treatment and vaccine development, particularly regarding the effectiveness of future vaccines in humans. Their recommendations to Member States for dealing with SARS-CoV-2 infections in mink are not so different from what is already happening in some countries, such as the Netherlands, where

systematic testing and monitoring of (dead) mink takes place with the culling of mink and destruction of carcasses and pelts on farms where SARS-CoV-2 has been detected.

It is, however, evident that the biosecurity measures taken by fur farmers, particularly in Denmark, have not been fully effective in stopping the transmission of COVID-19 to other mink farms, nor from infecting people who have come into contact with infected mink or farm workers.

For those countries that have mink farms and were not yet doing any kind of systematic testing of either mink or mink farm workers, the ECDC risk analysis precipitated a programme of testing. In Poland, for example, the screening of mink for COVID-19 on a proportion of fur farms only began after its publication. Furthermore, as will be outlined below, it is unclear whether other fur-bearing species held on farms are also being tested for SARS-CoV-2.



Commission Implementing Decisions

On 21st December 2020, the European Commission issued Commission Implementing Decision (EU) 2020/2183 concerning certain protective measures in relation to reporting infection with SARS-CoV-2 in minks and other animals of the family Mustelidae and in raccoon dogs (notified under document C (2020) 9531).¹³¹

This Decision set down the reporting requirements for Member States after the infection of mink and other named species with SARS-Cov-2. Within three days of infection, Member States were required to submit reports to the Commission and send weekly follow-up reports in the event of further occurrences or new outbreaks, which would be published on the Commission website.

This Decision is, however, no longer in force. It expired on 20th April 2021. However, Regulation (EU) 2016/429 on transmissible animal diseases and amending and repealing certain acts in the area of animal health (Animal Health Law) entered into force the following day.¹³²

The Animal Health Law not only covers the general reporting requirements in the event of disease outbreaks in all farmed animals, but should also provide the Commission with new powers to take proportionate emergency measures due to the nature of SARS-CoV-2. The question remains whether they will be prepared to take action.

Alongside the Animal Health Law, on 12th May 2021, Commission Implementing Decision (EU) 2021/788 laying down rules for the monitoring and reporting of infections with SARS-CoV-2 in certain animal species was issued by the European Commission.¹³³

The Decision establishes a mandatory diagnostic screening and reporting requirements for Member States with regard to monitoring for SARS-CoV-2 in both mink and raccoon dogs.

Amongst other things, this requires virological tests (oropharyngeal swabs) being taken on a weekly basis from either live or dead animals to cover the equivalent of at least 5% of the animal population, unless the Member State competent authorities carry out a risk assessment with a positive outcome. In this instance, the test frequency is reduced, but a larger sample must be taken every two weeks.

Nonetheless, the Decision renders it possible to switch to solely the passive surveillance of animals once there has been a positive outcome of such a risk assessment, as well as the health status of workers on the farm. In this instance, testing is only required in the event of increased animal, or the identification of animals with clinical signs associated with SARS-CoV-2; or SARS-CoV-2 positive cases among fur farm workers or their families.

Given that the majority of mink that have previously been found to be infected with the SARS-CoV-2 virus were actually asymptomatic, switching to such a passive surveillance protocol on mink farms is highly problematic and could result in the development of unidentified coronavirus reservoirs, which may pose a risk to broader public health.

EFSA and ECDC report

On 18th February 2021, the European Food Safety Authority (EFSA) and the ECDC published a report entitled Monitoring of SARS-CoV-2 infection in mustelids. This report was explicitly requested by the European Commission following the COVID-19 outbreaks on fur farms throughout Europe.

The report recognises that American mink, as well as ferrets, are highly susceptible to SARS-CoV-2, and that once the virus is introduced – primarily via infected humans - onto mink farms, it spreads very efficiently largely due to the high density of

animals on fur farms. Short distances between fur farms was also identified by the report as a risk factor for viral transmission between fur farms.

The early detection of SARS-CoV-2 is identified as a priority objective for monitoring activities at EU mink farms. In addition, the report lists a number of other species that should also be included alongside American mink in monitoring plans: ferrets, cats, raccoon dogs, white-tailed deer and Rhinolophidae bats.

OIE response to COVID-19 in mink and the trade in raw mink fur skins

On 12th November 2020, the World Organisation for Animal Health (OIE) issued a statement that acknowledged that susceptible animals, such as mink, could become a SARS-CoV-2 reservoir that may pose a continued public health risk and lead to future spillover events to humans.¹³⁵

While noting that there are important public health implications, the OIE advises that further investigation is needed to fully understand the impact of mutations of SARS-CoV-2 in mink and recommend close collaboration between animal and public health authorities - using a One Health approach - to better identify and reduce the impact of this disease.

The OIE recommends that countries implement risk reduction strategies and monitor susceptible animals, such as mink and raccoon dogs, as well as humans in close contact with them, for SARS-CoV-2 infection.

The report concludes that all mink farms should be considered at risk from SARS-CoV-2 and that monitoring should include active measures, such as the (random) testing of (dead or sick) animals using reverse transcriptase-polymerase chain reaction (RT-PCR) and the testing of staff in addition to passive surveillance by farmers and veterinarians. It also notes that positive samples from each farm should be sequenced to monitor virus evolution and results publicly shared.¹³⁴

All cases of SARS-CoV-2 should be reported to the OIE through the World Animal Health Information System and genetic sequences of the viruses isolated from animals and other research findings shared with the global health community.

Lastly, the OIE has developed guidelines for people working with susceptible farmed animals, as well as with wild mammals.¹³⁶

An assessment of the risk to human health posed by international trade in mink pelts, conducted by the OIE ad hoc Group on COVID-19 and safe trade in animals and animal products, concluded (report March 2021¹³⁷) that raw mink fur skins “cannot be considered as a safe commodity for international trade” and that additional evidence was needed to determine appropriate risk mitigation measures. Although the conclusions were included in the updated OIE guidelines of June 2021, it is unclear when any advice on mitigation measures will be published.

WHO, FAO, OIE, UNEP risk assessments and recommendations

In January 2021, the World Health Organisation (WHO), Food and Agriculture Organization of the United Nations (FAO) and World Organisation for Animal Health (OIE) issued a Risk Assessment, conducted at regional level to assess the overall risk of introduction and spread of SARS-CoV-2 within the fur farms, the spillover from fur farms to humans and the transmission of SARS-CoV-2 from fur farm animals to susceptible wildlife populations.¹³⁸

In Europe the overall risk was deemed high “due to highest number of fur farms compared to other regions concentrated in the same geographical areas, the high variety of susceptible animal species, and highest number of confirmed spillback

events from the infected farms into the local community in some European farms.” Noting the risk of spillover from fur farms to humans as high in Europe, the report also noted “As viruses move between human and animal populations, genetic modifications in the virus can occur and new variants are more likely to arise.”

In the Americas and Asia, the risk was moderate “considering the high volume of fur production in these two regions and the increase in human cases”. The risk was deemed minor in Africa “due to the low volume of fur production and low human infection rate”.

The WHO-convened Global Study of the Origins of SARS-CoV-2, Origins of the SARS-CoV-2 virus, was released on 30th March 2021.¹³⁹ It included specific recommendations relating to species farmed for their fur, including “surveys of other wild animals known to be infected by SARSr-CoVs should be conducted where they occur (e.g. civets, mustelids such as mink and ferrets, raccoon dogs)” and “surveys for SARSr-CoVs in farmed wildlife or livestock that have potential to be infected, including species bred for food such as ferret-badgers and civets, and those bred for fur such as mink and raccoon dogs in farms in China, in South-East Asia, and in other regions.”

On 12th April 2021, WHO, OIE and UNEP published interim guidance entitled ‘Reducing public health

risks associated with the sale of live wild animals of mammalian species in traditional food markets.’ Amongst the six recommendations included are for governments to “Suspend the trade in live caught wild animals of mammalian species for food or breeding purposes and close sections of food markets selling live caught wild animals of mammalian species as an emergency measure unless demonstrable effective regulations and adequate risk assessment(a) are in place.” The overview of the paper states “Although this document focuses on the risk of disease emergence in traditional food markets where live animals are sold for food, it is also relevant for other utilizations of wild animals.”

COVID-19 and other fur farmed species

To date, the focus of research, testing and political debate with regard to COVID-19 has primarily focused on mink farming. However, it is important to note that other species are also exploited for fur production, in particular foxes and raccoon dogs.

In Europe, both foxes and raccoon dogs are still exploited for fur production, primarily in Finland and Poland, both species are also farmed in their millions for their fur in China each year, and foxes also are bred for their fur in Canada and the United States.

Raccoon dogs

It is known that raccoon dogs are susceptible to coronaviruses and that this species may have been an intermediate host for the SARS-CoV virus.

Raccoon dogs sold on a wildlife market in Shenzhen, China were infected with SARS-CoV and the virus was found to be genetically almost identical to that found in palm civets, leading the scientists to suggest that both palm civets and raccoon dogs could be intermediate hosts for SARS-CoV.¹⁴⁰

A more recent scientific paper has concluded that raccoon dogs are susceptible to and can efficiently transmit SARS-CoV2 and may serve as intermediate host for this virus too.¹⁴¹

When asked – in April 2020 - about what was known about the intermediate host for SARS-CoV-2 could be, leading German virologist Professor

Christian Drosten noted that during the previous SARS epidemic this coronavirus had been “found in civet cats, but also in raccoon dogs – something the media overlooked. Raccoon dogs are a massive industry in China, where they are bred on farms and caught in the wild for their fur. If somebody gave me a few hundred thousand bucks and free access to China to find the source of the virus, I would look in places where raccoon dogs are bred.”¹⁴²

Raccoon dogs are included in the European Commission Implementing Decision (EU) 2021/788 laying down rules for the monitoring and reporting of infections with SARS-CoV-2 in certain animal species.¹¹⁶

Foxes

With respect to foxes, researchers in China found red foxes sold on a wildlife market in Guanzhou to have been infected with a SARS-CoV-like virus.¹⁴³ Scientists predicted that red fox host cell binding sites were capable of binding to SARS-CoV-2, which causes COVID-19, and SARS-CoV, which causes SARS.¹⁴⁴ It is unclear what measures have been taken by the countries where the farming of foxes is still permitted to monitor and test them for COVID-19.

Chinchillas

No studies have been yet conducted with regard to the susceptibility of chinchilla for the virus, but it cannot be excluded that they pose a possible risk.¹⁴⁵

Permanent closure of fur farms to protect public health and animal welfare

It is evident that mink – and most likely also raccoon dog and fox¹⁴⁶ - farming creates a potential reservoir for SARS-CoV-2 and future strains of this coronavirus. Decisive action must be taken to mitigate this present risk and to preclude risks in the future.

In view of the disease risks – in addition to the clear inherent animal welfare problems (not to mention the environmental impact) - posed by fur farming, Humane Society International strongly advocates a permanent end to breeding, keeping and killing animals for the purposes of fur production.

Fur farming is a non-essential industry. It exists solely to supply the frivolous needs of the fashion trade and produces products for which there are countless warm, beautiful and humane alternatives, which do not require the caging and killing of animals.

Banning fur production

Given widespread public opposition to the keeping and killing of animals for the production of fur on primarily ethical and animal welfare grounds, it can be posited that the permanent closure of fur farms would indeed receive a broad base of social support in most countries.

Indeed, fur farming has already been prohibited and/or is presently being phased out in nine Member States including Austria, Belgium, the Netherlands, Luxembourg, Slovenia, Czech Republic, Slovakia, Croatia and Estonia. Outside of the European Union, the United Kingdom, Norway, Serbia, the Republic of Macedonia and Bosnia and Herzegovina have also banned fur production. French politicians are currently debating a ban on mink fur farming and the Irish government has made a commitment to bring forward legislation in 2021.

Legislative proposals to ban fur farming are currently also under consideration, or have been announced, in Poland, Lithuania and Bulgaria.

It is notable that while Ireland has had no confirmed cases of COVID-19 on its 3 remaining fur farms, the Department of Health recommended that all 120,000 mink should be culled and the farmers prohibited from restocking.¹⁴⁷

In addition to the aforementioned fur farming bans and industry phase-outs, Switzerland and Germany have adopted stricter regulations, which have effectively eliminated the breeding of all animals for fur. Sweden similarly eliminated fox and chinchilla production in this way. Denmark has also prohibited and is phasing out the breeding of foxes on animal welfare grounds.

On 25th November 2020, although none of the species are currently kept there, Hungary announced a ban on mink, fox, ferret¹⁴⁸ and coypu production as a precautionary measure due to animal welfare and COVID-19 concerns to prevent fur producers from elsewhere in Europe from moving their operations to the country.¹⁴⁹

Public health reasons

As illustrated by the discussion above, from a public health perspective, the continued presence of mink farms would serve to maintain reservoirs of SARS-CoV-2 within human communities.

Moreover, genetic mutations in the virus in mink, which have already been seen in Denmark, may affect our ability to halt the spread of and eliminate the disease and undermine the efficacy of any future vaccine. It is therefore necessary to eliminate this viral reservoir to avoid undermining efforts to control and eradicate COVID-19.

The outbreaks of COVID-19 on fur farms in Europe and North America raise critical issues about the risks posed by intensively keeping animals in close confinement for the purposes of fur production. The continued existence of fur farms, which solely exist for the production of luxury products for which there are many good and humane alternatives, also perpetuates a needless potential reservoir for future emerging infectious viral diseases.

There is no good societal – or moral - justification to allow fur farming to continue. Closure of the industry would only have a limited economic impact on a small group of individuals profiting from the practice of exploiting animals for their fur. The protection of human health – as well as animal welfare – outweighs the interests of a tiny minority who operate fur farms.

It is also pertinent to note that Members of the European Parliament also share these concerns about the practice of fur farming. In their Resolution of 9th June 2021 on the EU Biodiversity Strategy for 2030, they observe that “fur production, which involves the confinement of thousands of undomesticated animals of a similar genotype in close proximity to one another under chronically stressful conditions, can significantly compromise animal welfare and increases their susceptibility to infectious diseases including zoonoses, as has occurred with COVID-19 in mink”.¹⁵⁰

Lastly, during the Agriculture and Fisheries Council meeting of 28th -29th June 2021, the Netherlands and Austria presented an information note to EU Agriculture Ministers on the issue of fur farming. This was formally supported by Belgium, Germany, Luxembourg and Slovakia.¹⁵¹ They called on the European Commission to undertake appropriate action to end fur farming in Europe, setting out their reasons for this request in terms of animal welfare, ethical considerations and the risks posed to public health. At this meeting, 12

Agriculture Ministers spoke in favour of eliminating fur production in the EU, including Poland, Italy and Bulgaria.

Protecting biodiversity

It is also relevant to note that the continued existence of this disease reservoir also poses a risk to native wildlife. American mink is an invasive alien species. Fur farms have always been the key pathway of the introduction thereof and this species has long been implicated in the displacement of native mammals and biodiversity loss.¹⁵²

If infection by SARS-CoV-2 spills into wild mustelids, these have the potential to become a permanent reservoir of infection for humans and other animal species. Such a scenario has been seen before with rabies in raccoons and skunks.¹⁵³ In some countries, this could also pose a risk to the European mink, which is a critically endangered species and extinct in most of its original range, partly due to competition with the invasive American mink.¹⁵⁴

Recommendations

As stated above, HSI unequivocally advocates the permanent closure of all fur farms to protect animal welfare, the environment and human health.

In all countries where fur farming is still permitted and/or is already being phased-out, it is necessary to take urgent and proportionate action to prevent the risk of maintaining reservoirs of SARS-CoV-2 and of jeopardising the effectiveness of the vaccines that are now being rolled out to protect human populations around the globe from the deadly coronavirus.

Given the devastating economic and social crisis caused by the global COVID-19 pandemic, the risk of a mutated virus in mink compromising the effectiveness of vaccines for humans cannot be afforded. Certainly not for the sake of a minor and cruel industry that exists solely for the production of fashion products that no-one actually needs.

The next global pandemic could well find its origins or be spread through the needless practice of exploiting animals for the production of fur. The key question that policymakers, politicians and citizens of countries that continue to permit fur production should be asking is whether this is truly

worth the risk to human health, our economy and social cohesion?

It is also becoming increasingly evident that COVID-19 is going to continue to pose a threat to humankind for the foreseeable future. While vaccine programmes are starting to make the disease more manageable and lowering the risk of mortality and serious illness in human populations, new variants of the SARS-CoV-2 virus, such as the English, Brazilian and South African variants, are also already spreading across Europe. It is not known whether such variants will reduce the efficacy of the existing vaccines. The same applies to any variant that has mutated in farmed mink.

Vaccines for mink are not the answer

The fur industry claims that it has developed vaccines to protect mink from SARS-CoV-2.¹⁵⁵ Leaving aside the issue of whether such a vaccine could ever be cost-effective, it should be noted that this is not a solution to the problem.

No vaccine is 100% effective, and if the coronavirus continues to mutate in mink or in people, the vaccines may not be effective for more than a season. In that case, vaccines would only be

a short-term fix, and mink farmers would have to vaccinate the animals periodically. As with people, even if the mink vaccine is effective, other infection control practices would still need to be done to keep the virus from spreading.

If the vaccine reduces disease in the mink, but does not stop infection, the virus could still spread on a fur farm and be more difficult to detect making mink fur farms silent reservoirs of the virus. There is the very real possibility that an infected mink will again be able to transmit the virus back to people, starting the cycle again.

In its recent assessment of the risk to human health of a possible resumption of mink farming after 2021, Denmark's Statens Serum Institut stated that it is also not possible to predict whether and to what extent vaccinated mink (if a mink vaccine is developed and used) may result in selection for new virus variants that are not covered by the vaccine, or breakthrough infections with these. It is also not known whether such breakthrough infections with new virus variants will be a challenge in subsequent transmission to humans, as well as the effect of the human vaccines.¹⁵⁶

In late September 2021, it was announced that Finnish Fur Breeders' Association would start vaccinating minks in the autumn after having been granted a conditional license by the Finnish Food Authority to use an experimental vaccine, called 'FurcoVac', which was developed by researchers at the University of Helsinki. The vaccine reportedly uses "the same raw materials that are needed to produce the vaccines used in humans".¹⁵⁷

Given the continuing pandemic and global vaccine inequality, HSI believes that it is highly inappropriate to use raw materials for vaccine production for mink when developing countries do not have a sufficient supply of vaccines to protect their human populations from COVID-19. **The only way in which both human and animal health can be protected in the long term is to ensure that all unnecessary reservoirs for the SARS-CoV-2 virus - and potentially other emerging viral diseases - are eliminated. Permanently.**

Denmark, Sweden and eventually Italy introduced bans on breeding mink during 2021. The remaining Belgian fur farmers (whose industry is due to be phased-out by 2023) decided voluntarily to cease breeding this year. Aside from in Denmark where all the mink were culled, only the breeding

stock remain on the farms in countries where breeding was suspended.

It is lamentable that other EU Member States – or US States and Canadian Provinces – did not use the window of opportunity between the pelting and breeding seasons to ensure that the farmed mink population did not expand in 2021. COVID-19 outbreaks continued to occur on fur farms even while they were not 'fully stocked', as was evidenced in, for example, Latvia.

By May 2021, the farmed mink population - in countries where breeding continued - had expanded by at least five-fold as the pups were born. It is already a tragedy that these animals are born into a short life of captivity for fur production, but it is an even bigger tragedy that many of these animals have already had to be culled as the result of virus outbreaks that have happened already this year. This was an entirely preventable situation.

The costs to the taxpayer of the monitoring and testing of mink for COVID-19 should also not be disregarded. Mandatory testing is now taking place in EU Member States, but this also comes with a hefty price tag. It is unacceptable and disproportionate that a society bears the cost of disease control for animals that are being exploited solely for the purpose of fur production; a practice that the majority of EU citizens oppose.

Emergency interim public health measures in lieu of fur production bans

Notwithstanding urgently developing and enacting legislative proposals to end fur farming at a national level, which HSI believes is the only way in which both human and animal health can be protected, in the interim HSI advises countries where fur farming is still legally permitted to at the very least take the following precautionary actions:

1. No restocking of mink farms where animals have been culled should take place;
2. In the absence of a complete ban on fur production, fur producing countries must suspend all mink farming, beginning with the implementation of a breeding ban from winter 2021 onwards.
3. All cross-border transportation of live mink and the transport of live mink between farms within national borders should be prohibited;

4. The export and import of raw mink pelts should be prohibited immediately, given that the OIE has stated that the commodity cannot be considered safe for international trade; raccoon dogs and foxes, plus raw furskins from these species, to also eliminate any potential risk of disease transmission from trade involving these species.
5. All operations engaged in fur farming, including companies who handle raw mink pelts, should be mandatorily registered with the competent authorities; The actions outlined above are emergency measures only for the immediate protection of human health.
6. Countries where fur farming is currently legal should encourage farmers to transition away from the practice at the earliest opportunity. Those countries may consider making proportionate financial support available to fur farmers *exclusively* to cover costs of dismantling of fur farming operations, professional retraining and assistance with transitioning to other (non-animal) activities; **HSI emphatically underlines our position that the only way to definitively protect both human health and animal welfare in the long term is to ensure that legislative action is taken to permanently end fur farming in the countries where it is still legally permitted.**
7. Adopt preventive restrictions on the breeding, transport and live export/import of live The risk the continued existence of fur farms poses to society outweighs the limited economic benefits it delivers to the small minority engaged in the inhumane practice.

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