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Dato for henvendelse	Dato for svarfrist	Dato for afsendelse	Versionsnummer
01/03/2022	11/03/2022		

Journalnummer/sagsnummer	FVST	KU	SSI
	2022-14-81-19374	061-0279/22-3680	22/01154

Besvarelse vedr.

‣ Anmodning om vurdering af plasmacytosevirus overlevelse i miljøet i tidligere minkbesætninger

Bestilling

‣ Fødevarestyrelsen ønsker en vurdering af, om plasmacytosevirus på nuværende tidspunkt kan forventes at være deaktiveret i de minkbesætninger (udstyr, gylle/gødning og jordoverflade), der på nuværende tidspunkt har stået tomme i mere end et år.

Hvis dette ikke er tilfældet, ønskes en vurdering af, hvor lang tid, der vil gå, før besætningen vil være fri for smitten.

Svar

Summary
Aleutian mink disease or plasmacytosis has had major economic consequences on the mink farming industry worldwide as it affects both the fur quality and the health and welfare of mink. The virus causing this disease (either called Aleutian mink disease virus (AMDV) or plasmacytosis virus) is a single-stranded DNA virus of the genus Amdoparvovirus belonging to the family of *Parvoviridae*. Viruses within this family are known to be very stable in the environment. For example, studies using a porcine parvovirus indicated little or no loss of virus infectivity after 40 weeks storage in slurry or cell culture medium at 5°C or 20°C (Bøtner & Belsham, 2012, Bøtner, 1990). Thus, it is much more stable than many other viruses and it seems very likely that AMDV infected mink that were alive until November 2020 will have shed virus into the environment that will still be present there. Furthermore, this virus is able to infect free-ranging American mink (*Neovison vison)* (escaped from farms) and also the endogenous European mink (*Mustela lutreola*) and maybe other species. Thus, it seems likely that continued virus circulation in Denmark is occurring. Taken together, it is likely that AMDV on and around former mink farms has not been inactivated after the cull in 2020 if no disinfection procedures have been performed.

Circulation of AMDV outside of farmed mink
In Denmark, the incidence of AMDV among farmed mink has been relatively low in recent years, although focused in Northern Jutland. Major outbreaks were seen in 2015, that involved both the classical AMDV Sæby-strain and other strains (Ryt-Hansen et al. 2017). The circulation of AMDV outside of farmed mink has been observed previously. Indeed, it has been shown that particular strains of the virus have circulated in free-ranging mink in Denmark for prolonged periods of time and were often unrelated to the strains detected on mink farms. One example of this was on Bornholm, where a high percentage of the free-ranging mink were tested positive for the virus while no mink on farms tested positive, and this was a pattern continuing on Bornholm for more than a 10 year period (Jensen et al. 2012). However, the same strains that were found in farmed mink have also sporadically been detected in free-ranging mink and badgers (e.g. Chriél et al. 2017), suggesting that AMDV virus has been transmitted between farmed mink and wildlife.

One thing that may affect virus persistence in the future is an expected drop in the population of free-ranging mink. It has been postulated that up to 80% or more of the Danish population of free-ranging mink is spill-over from farms since the American mink is not really an efficient breeder under free-ranging conditions in Denmark.

Over a 10 year period, with increased focus on farm biosecurity to keep wildlife out and mink inside the farm area, the population of free-ranging mink seems to have dropped. This decrease in population has been assumed based on the numbers of hunted mink. These numbers peaked at 7913 mink in 2000 and reached their lowest point in 2019 (1811) and 2020 (1456) (Hunting bag statistics). There are no numbers available for 2021 yet, but based on the assumption that a large part of the mink killed as free-ranging are spill-over farm mink, then the numbers can be expected to drop considerably after the cull of all farmed mink in 2020.

A low population of free-ranging mink would make it difficult, but not impossible, for the virus to persist in the free-living population but other wildlife, especially of the mustelidae family could also contribute to the persistence of AMDV. One other factor contributing to the maintenance of the virus is its ability to cause a persistent disease, this allows the animal to transmit disease over a long period of time, even if contacts between free-ranging mink are rare. In addition, mink kits can be infected vertically from infected females, with not only trans-placental transmission possible but the placenta is also a site of virus replication (Broll and Alexandersen, 1996). There is some indication that mink kits infected transplacentally develop an even milder and slower developing disease (Porter et al., 1977).

Stability of parvoviruses in the environment

Experimental studies using porcine parvovirus have demonstrated the remarkable stability of this virus either in animal slurry or within cell culture medium (Bøtner, 1990; Bøtner & Belsham, 2012). In contrast to a variety of other animal viruses (with either RNA or DNA genomes), porcine parvovirus retained high levels of virus infectivity (almost undiminished) after incubation at either 5°C or 20°C for 40 weeks. The next most stable virus analysed was Aujeszky virus that required about 15 weeks incubation for full inactivation at 5°C and 2 weeks at 20°C. This marked stability means that AMDV, which as mentioned above, is also a parvovirus, that was shed into the environment by farmed mink before the cull or from free-living mink can still be expected to be present in the environment and may therefore infect any susceptible hosts that may come into contact with it.

AMDV is highly resistant to environmental conditions and survives high temperatures and chemical treatments (Eklund et al., 1968; Cho, 1976, Hahn et al., 1977; Porter et al., 1977, Hussain et al., 2014). AMDV has been reported to survive for 2 years or more in soil and in improperly composted manure or carcasses. The stability of AMDV in the environment has been highlighted as a contributing factor in the persistence and re-infection of mink farms, as well as a facilitator of virus spread in wildlife and within and between farms (Hahn et al., 1977, Bloom 1994, Prieto et al., 2014).

Conclusion

Based on present knowledge, it is difficult to assess when infectious AMDV, currently present in the environment of mink farms where the minks have been culled, will be fully inactivated.

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