

Udarbejdet af	Anette Bøtner, Graham Belsham
Øvrige deltagere	
Kontaktperson i FVST	Sten Mortensen, Kim Sigsgaard

Dato for henvendelse	Dato for svarfrist	Dato for afsendelse	Versionsnummer
01-12-2020	07-12-2020 kl 10.00	04-12-2020	01

Journalnummer/sagsnummer	FVST mangler	KU 061-0177/20-3680	SSI 20/14356
--------------------------	-----------------	------------------------	-----------------

## Besvarelse vedr.

### ‣ Minkgrave

#### Bestilling

‣ Temmelig mange aflivede mink er deponeret i 2 store grave i Jylland.

Der ønskes svar på følgende spørgsmål:

- Konsortiet har tidligere udmeldt, at smittefare vil være væk efter 6 måneder på denne tid af året. Vil smitten være inaktiveret tidligere, når temperaturen i biomassen i gravene er betydeligt højere, både på grund den biologiske nedbrydning og af den kemiske reaktion med kalken?
- Hvor lang tid kan der forventes, at der udvikles metangas eller anden gas fra biomassen af nedgravede mink?
- Kan der laves en korrelation mellem biomassen og mængden af gas, der udvikles?
- Hvad er tidsperspektivet, som Fødevarestyrelsen skal forholde sig til i forhold til afspærring af området? Altså hvor lang tid estimeres der at gå, før området er sikkert at færdes i med hensyn til gasudvikling, smittefare og bæreevne?
- Hvor længe kan Fødevarestyrelsen forvente, at der vil gå, før alle dele af minkene er nedbrudt og lagene af mink vil fremstå som muld?

#### Baggrund/kontekst for bestilling (hvorfor, til brug for hvad)

‣ Baggrunden for bestillingen er arbejdet med de minkgrave, der er lavet i Jylland, hvad angår stillingtagen til gravenes fremtid og sikkerheden omkring dem.

#### Svar

‣ From earlier studies, it is known that coronaviruses can survive for extended periods under cool conditions. Specifically, Bøtner (1991) showed that TGEV was not fully inactivated after 8 weeks, in slurry, at 5°C and survived even better in tissue culture medium at this temperature. However, at 20°C, the survival time in both slurry and cell culture medium was rather shorter and inactivation was achieved within 3 weeks.

Riddell et al (2020), using SARS-CoV-2, found that infectious virus could be isolated for up to 28 days from a variety of surfaces (e.g. metal) when stored at 20°C. These data appear consistent with the earlier data from Bøtner (1991).

Thus, if the temperature in the burial sites is increased then the time required for virus inactivation, due to temperature alone, is reduced. We do not know the extent to which the temperature will be increased throughout the burial site or the duration of this effect.

The treatment with calcium oxide ("kalk") should increase the pH and is likely to be effective at inactivating virus on the surface of the mink that is exposed to the "kalk" or liquid run off from it.

However, SARS-CoV-2 within the carcasses of infected mink that is not exposed to the elevated pH (due to lack of liquid penetration) will not be affected by this inactivating effect.

Strongly acidic conditions (pH 3 or below) can also inactivate the SARS virus but pH 3 is not completely effective under cool conditions (5°C) (Darnell et al., 2004).

## Conclusion

We do not know exactly the conditions that will occur within the buried mink in terms of temperature and pH. Highly alkaline or highly acidic conditions can effectively inactivate the virus but such treatments are likely to only affect virus on the surface of mink exposed to the chemical treatment. Non-exposed virus will decay in a manner that is temperature dependent. Cool temperatures (e.g. 5°C) favour virus survival and infectious virus can be expected to survive for several months under these conditions but, even at 20°C, coronaviruses can survive for some weeks.

## References:

Bøtner A (1991) Modelstudier vedrørende overlevelse af virus i gylle under traditionel opbevaring og under udrådning i biogasanlæg. Statens Veterinære Institut for Virusforskning. Lindholm 1990

Darnell ME, Subbarao K, Feinstone SM, Taylor DR. Inactivation of the coronavirus that induces severe acute respiratory syndrome, SARS-CoV. *J Virol Methods*. 2004;121(1):85-91.  
doi:10.1016/j.jviromet.2004.06.006

Riddell et al. *Viol J* (2020) 17:145 (<https://doi.org/10.1186/s12985-020-01418-7>)