Qualitative assessment of the risk of SARS-CoV-2 to human health through food exposures to deer in the UK: Hazard identification

The British Deer Society Deer Distribution Survey 2007 survey shows Roe deer (Capreolus capreolus) being the most widespread. Chinese Water deer (Hydropotes inermis) are the smallest deer population with approximately 700 deer. Other deer populations found in the UK are Red deer (Cervus elaphus), Fallow deer (Dama dama), Muntjac (Muntiacus reevesi) and Sika deer (Cervus nippon). The number of wild deer of all species is estimated at around 2 million, with an annual cull of over 300,000. (Gavin et al., 2019). Farmed deer are principally red deer and make up approximately 27,000 (DEFRA 2021).

Letko et al., (2020) and Walls et al., (2020) show that SARS-CoV-2 requires Angiotensin Converting Enzyme 2 (ACE2) receptors in order to be able to infect a cell; early in the pandemic, Damas et al. had predicted that white-tailed deer may be susceptible to SARS-CoV-2 infection due to their high expression of ACE2 (Damas et al. 2020). The ability of white-tailed deer to be infected has now been confirmed (see Defra, 2022). There is preliminary evidence that UK red, fallow, and roe deer have ACE2 receptors in various tissues, including the nasal passages, the upper respiratory tract, and the digestive tract (APHA, personal communication). It is not currently known whether other proteins necessary for SARS-CoV-2 entry into cells are also present in these deer (uncertainty), although the presence and distribution in tissues of ACE2 in these UK deer populations suggest that they could also shed virus in their nasal secretions and faeces. So far, only one study has been published testing the presence of SARS-CoV-2 in the UK deer population. It analysed serum collected between 2020-2021 from 1,748 UK deer; it found no evidence of SARS-CoV-2 infection in any of the samples (Holding et al. 2022). Additional testing of archived samples, collected between May 2021 and April 2022, by the Animal and Plant Health Agency has identified one UK fallow deer, out of 40 archived deer samples, as seropositive for SARS-CoV-2 (APHA personal communication; Defra, 2022). Another study performed in Germany and Austria tested serum collected from 232 deer, including roe, red, and fallow deer; it found no evidence of SARS-CoV-2 infection in its deer population (Moreira-Soto et al. 2022).