

Investigating the impact of environmental factors on the African Swine Fever epidemic in Belgium

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The African swine fever (ASF) is a devastating disease of domestic pigs and wild boars caused by a DNA arbovirus, African swine fever virus (ASFV). ASFV is originated from sub-Saharan African countries, but during the last ten years, the virus has left its endemic range to spread to eastern European countries and the Russian Federation. On September 2018, authorities in Belgium reported that ASF had been confirmed in two wild boars (1 found dead and 1 sanitary shot) in a southern area of the country, very close to the shared borders with France and Luxembourg. On April 2019, more than 770 positive cases had been reported in wild boar populations and the epidemic is currently not under control. One should note that no case has yet been reported in domestic pig farms in Belgium. We present the application of recently developed methods to quantify the local velocity of an invading epidemics. In addition, we developed and applied a novel analytical framework that uses occurrence data to analyse the impact of environmental factors on the dispersal velocity and pattern of the spread. In particular, we aim at assessing (i) the impact of forest coverage and installed fences on the dispersal velocity, (ii) the impact of installed fences and motorway segments acting as barriers to dispersal. Our new analytical procedure involved a null model based on a randomisation procedure allowing the estimation of statistical support for the impact of each environmental factor separately. The developed methodology has the potential to be quickly applied on similar outbreak data sets solely made of occurrence data, with key benefits for the epidemiological investigations of external spatial factors impacting pathogen dispersal across non-endemic area.