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Transmission of African swine fever virus from infected pigs by direct contact and aerosol routes

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ABSTRACT

In 2014, African swine fever virus (ASFV) was introduced into the Baltic states and Poland. Since then, the disease has continued to spread within these regions, and recently, cases were reported in the Czech Republic and Romania. Currently, there is an increasing risk of ASFV introduction into Western Europe. Hence, there is an urgent need to assess current contingency plans. For this purpose, knowledge of modes-of-transmission and clinical outcome in pigs infected with new European ASFV strains is needed.

In the present study, two experiments were conducted in pigs using an isolate of ASFV from Poland (designated here POL/2015/Podlaskie/Lindholm). In both studies, pigs were inoculated intranasally with the virus and contact pigs were exposed to the experimentally infected pigs, either directly (contact within and between pens) or by air.

Pigs exposed to the virus by intranasal inoculation, by direct contact to infected animals and by aerosol developed acute disease characterized by viremia, fever and depression. Infectious virus was first detected in blood obtained from the inoculated pigs and then sequentially among the within-pen, between-pen and air-contact pigs. ASFV DNA and occasionally infectious virus was found in nasal-, oral-, and rectal swabs obtained from the pigs, and ASFV DNA was detected in air samples. No anti-ASFV antibodies were detected in sera.

In conclusion, the study shows that the currently circulating strain of ASFV can be efficiently transmitted via direct contact and by aerosols. Also, the results provide quantitative transmission parameters and knowledge of infection stages in pigs infected with this ASFV.

1. Introduction

African Swine Fever (ASF) is a severe viral haemorrhagic disease affecting swine (Mebus, 1988). The disease is caused by African swine fever virus (ASFV) which is a large, enveloped, DNA virus and the sole member of the genus *Asfivirus* within the family *Asfarviridae* (Dixon et al., 2005).

In 2007, ASFV was introduced into Georgia and subsequently into other Transcaucasian countries, the Russian Federation, Ukraine and Belarus (EFSA Panel on Animal Health and Welfare, 2014). In the beginning of 2014, outbreaks of the disease occurred in the Baltic states and Poland, within wild boar and domestic pigs (EFSA Panel on Animal Health and Welfare, 2015). Outbreaks have continued to occur in the Baltic states and Poland, and more recently, in 2017, ASFV has been reported in wild boar in the Czech Republic and in domestic pigs in Romania

(http://www.oie.int/wahis_2/public/wahid.php/Diseaseinformation/WI).

The continued circulation of the virus in Eastern Europe means that there is a risk of further spread of ASFV into Western Europe. In European countries, with a large swine production and substantial exports of swine products, it is predicted that ASF outbreaks will have huge economic consequences, especially due to export restrictions (Halasa et al., 2016a,b). Hence, enforcement of current ASF contingency plans to achieve early detection and eradication of the disease in these countries is of major importance in order to limit these costs (Halasa et al., 2016c). Currently, since no vaccine or treatment options are available to prevent the infection (Zakaryan and Revilla, 2016), the

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