African swine fever in the Russian Federation: geo-spatial analysis and evaluation of the economic impact

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African swine fever (ASF) is a viral disease of domestic and wild pigs which leads to almost total mortality among the affected animals. Due to the absence of the vaccine the only measure to prevent spread of the disease is total slaughter of livestock population in the focus of infection and depopulation within the risk zone. The necessary measure is restriction of transportation and trading of animals and pork products. More than 280 ASF outbreaks have been reported from private holdings, large pig-breeding farms and in wild boars population in the territory of the Russian Federation since 2007. The analysis of spatial distribution of ASF cases performed by means of GIS-technologies demonstrates a correlation between the disease spread and direction of primary transportation links, domestic swine population density and human population density. This allows us to make a conclusion about predominately anthropogenic nature of the virus transmission by transportation and trade of live animals and contaminated agricultural products. MaxEnt software modeling with regard to detected risk factors allowed us to create a risk map which indicates the probability of emergence and spread of the disease in different regions of the European part of the country. The evaluation of economic losses caused by ASF in 2010-2011 was performed using the methodology adopted by the OIE considering both direct impact to livestock sector (costs of animal slaughter in the focus of infection and depopulation in the risk zone, losses of processing industry, indemnity payments to owners) and indirect losses associated with transportation and touristic restrictions, feed and grain trading bans, etc. According to experts’ opinion the total economic damage was 2271 million Rubles (about 57 million Euros) in 2010.