LUMPY SKIN DISEASE EPIDEMICS IN EUROPE: ASSESSMENT OF DISEASE SPREAD AND VACCINE EFFECTIVENESS

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LSD EPIDEMIC IN EUROPE 2015-2018

Lumpy skin disease is an economically important **cattle and buffalo** infectious disease. LSD is endemic in most sub-Saharan African countries, but it reached Turkey in and in 2015 LSD was reported in Greece. In 2016 the disease spread over the **Balkan region** (see movie map), where a **regional vaccination campaign** supported by the EC and based on **LSD homologous strain vaccine** started. By the end of 2017, the number of outbreaks had fallen by 95% remaining concentrated in areas with the lowest **vaccination coverage**. In 2018 no outbreaks have been reported in the Balkan region, showing the effectiveness of the vaccination campaign in this area. However, outbreaks were still reported in Turkey, in Georgia and in Russia. The disease had not been eliminated yet and, therefore, the vaccination program in the Balkan region is continuing.

Use the QR code to see the movie map of LSD spread and vaccination in Europe

ASSESSMENT OF LSD SPREAD

By collecting data in close collaboration with the national authorities of the affected countries in South Eastern Europe, EFSA developed a **kernel-based model** to assess the **between-herd spread** of LSD, by fitting it to outbreak data collected from Albania in 2016. The majority of transmission occurs over short distances (<5 km), but with an appreciable probability of transmission at longer distances (Fig.1). Details of the modelling approach are available at EFSA (2018) and Gubbins et al., (in press).

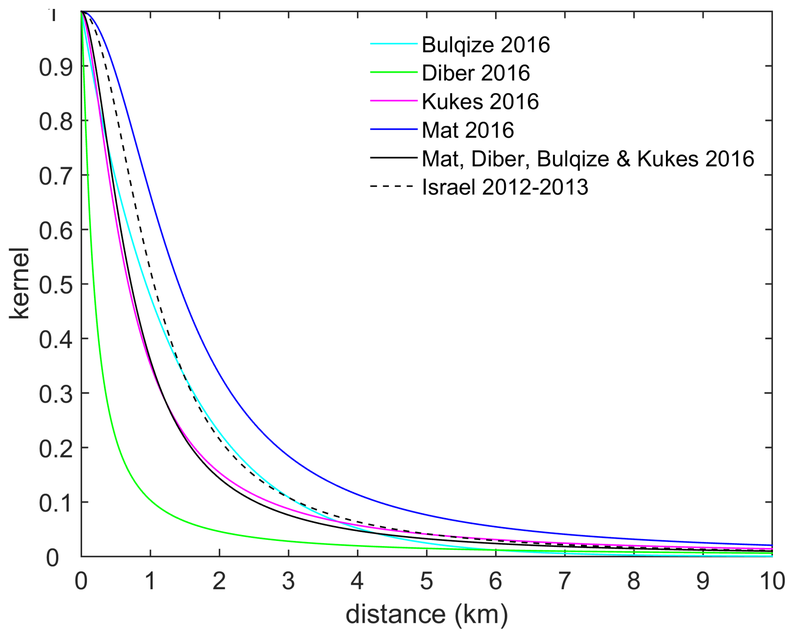

Fig.1 - Estimated kernels (relative probability) for the transmission of LSDV between farms in 2016 in each of the four Albanian districts considered and for the four combined. The spread of LSDV between farms in Israel in 2012–2013 is also shown for comparison.

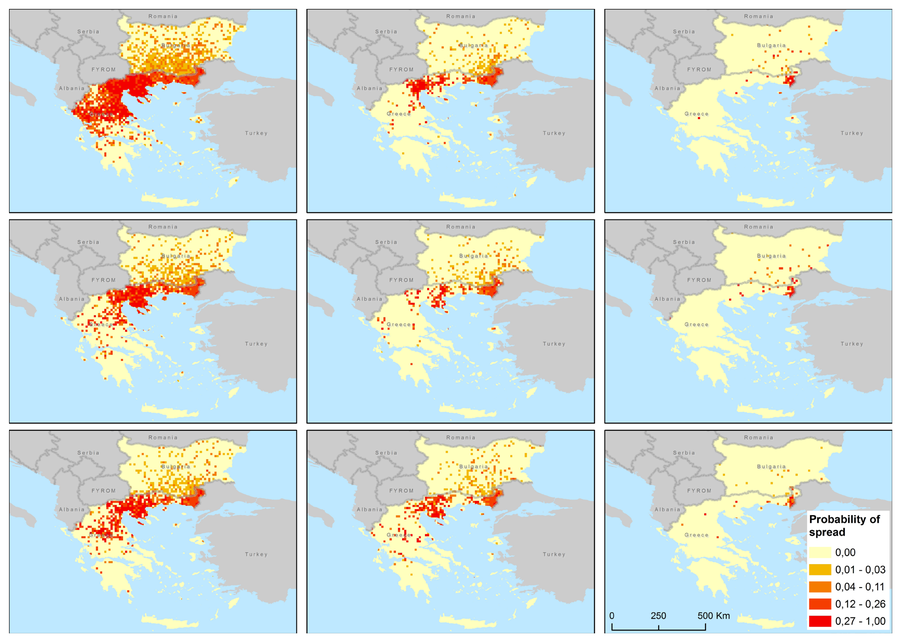

Fig.2 - Predicted impact of different combinations of vaccination and stamping-out strategies on the geographical spread of LSDV in Bulgaria and Greece. Vaccination effectiveness is set at 75%

The model was applied to assess the effectiveness of the two main control measures, i.e. **culling or vaccination**. For example, the model was used to assess the probability of LSD spread when different culling and vaccination policies are combined (Fig.2): vaccination has a greater impact than any culling policy (partial or total stamping out). Further details are available at EFSA (2016).

ESTIMATION OF VACCINE EFFECTIVENESS AGAINST LSD

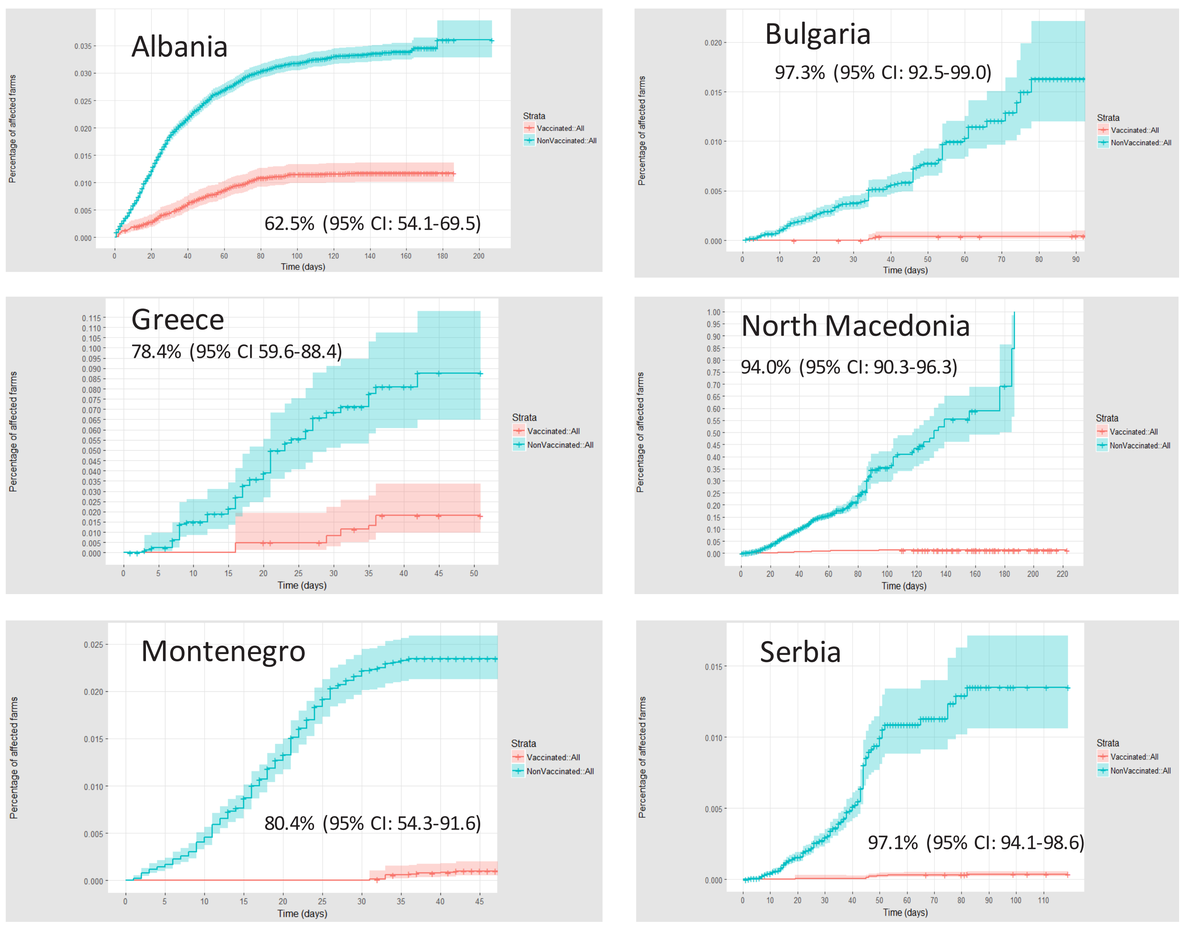

Fig. 3 - Accumulation of farms affected by lumpy skin disease (LSD) during 2016 among LSD vaccinated (red) and non-vaccinated (blue) farms. The shades represent the 95% confidence intervals. The percentages are the vaccine effectiveness

The **field effectiveness** of LSD live attenuated vaccine was evaluated in six Balkan countries. Vaccine effectiveness was evaluated by **survival analysis** (Fig.3). Overall its level was 79.8 % (95% CI: 73.2-84.7).

Additional data available for Greece from the regional unit of Serres allowed evaluating other risk factors such as **indoor** compared to **outdoor herds**, due to different exposure to vectors (Fig.4). Outdoor herds were 5.7 times higher at risk for LSD, compared to indoor herds, adjusted for the effect of vaccination. Vaccination was 81% effective in protecting both grazing and non-grazing farms from LSD infection. The higher risk in outdoor herds might be also a result of lower herd immunity as a result of their spatial clustering and late vaccination, compared to indoor herds. Details on the analysis are available at Klement et al. (in press) and EFSA (2018).

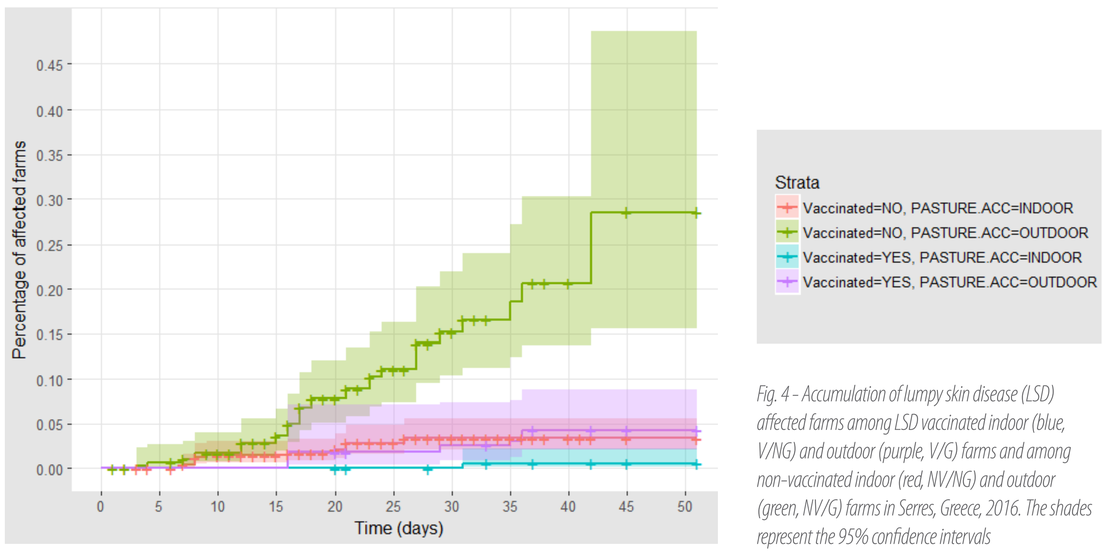

Fig. 4 - Accumulation of lumpy skin disease (LSD) affected farms among LSD vaccinated indoor (blue, V/NG) and outdoor (purple, V/G) farms and among non-vaccinated indoor (red, NV/NG) and outdoor (green, NV/G) farms in Serres, Greece, 2016. The shades represent the 95% confidence intervals

Acknowledgments: A. Miteva (Food Safety Agency, Bulgaria); Ž. Acinger-Rogić (Ministry of Agriculture, Croatia); L. Pite (previously at Ministry of Agriculture and Rural Development, Albania); I. Fragkou and C. Dile (Ministry of Rural Development and Food, Greece); B. Murati (Food and Veterinary Agency, Kosovo*); A. Nemet and Z. Mehmedbašić (Veterinary Office of Bosnia Herzegovina); M. Nikolic and V. Dakovic (Ministry of Agriculture and Rural Development, Montenegro); V. Kondratenko and Z. Atanasov (Food and Veterinary Agency, North Macedonia); T. Labus and Budimir Plavsić (Ministry of Agriculture and Environmental Protection, Republic of Serbia); the members of the EFSA Panel on Animal Health and Welfare

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Want to know more about EFSA's work on LSD?

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