P2 4: A simple method to evaluate the number of doses
to include in a bank of vaccines.
The case of Lumpy Skin in France

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The preparedness for a good and rapid response against some exotic diseases includes the availability of vaccines. The objective of this paper is to describe a simple method to estimate the size that a vaccine bank should have to manage an emergency vaccination campaign against Lumpy Skin Disease (LSD) in France.

Methods: To determine the size of the vaccine bank, the following factors were taken into account: 1) The average speed of the LSD through the affected area, estimated by Mercier et al. (2017) in 7.3 km / week. 2) The time required to obtain a full vaccination coverage, and 3) The cattle density in the area. It was assumed that all cattle present in the area will be vaccinated using a single dose per animal.
An Excel file with a macro was used to simulate ten thousands scenarios of LSD spread in France. To simplify the calculations, the French departments were considered as squares, and the index case was located randomly in the department. If the radius around the index case exceeded the department, it extended through the other departments in the region. Results were validated using a more complex model developed in R (R Development Core Team., 2013), which reproduced the real geography of France.

Results: The median of the vaccine doses need by both methods are significantly different (between 19% and 23% more vaccines are needed according the simple method). But both methods fit quite good when determining the number of doses that would be necessary in 90% of the cases. For a 7 weeks period (radius of 51.1 km), 750 000 doses of vaccine would be enough for 90% of the simulations, while for the more refined method the number of doses was 680 000 (difference of 10%).

Discussion: The method is simple and easy to use, and can be adapted to different conditions and diseases. It fits reasonable good with a more sophisticated method that takes into account de farms actually present in the zone. No jumps of the disease to long distances have been considered. At the department level, the results present more important differences (in some cases the number of vaccine needed are two folds higher using one method than using the other one).

Acknowledgements

Reference:
Mercier A, Arsevska E, Bournez L, Bronner A, Calavas D, Cauchard J, Falala S, Caufour P, Tisseuil C, Lefrançois T, Lancelot R: Spread rate of lumpy skin disease in the Balkans, 2015-2016. Transboundary and Emerging Diseases 2017 Feb 26. [Epub ahead of print].