A multi-criteria risk-ranking framework to prioritize pathogens: a case study for transboundary animal diseases in Europe

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What's SPARE?

The SPARE project (*SPatial risk assessment framework for Assessing exotic disease incuRsion and spread through Europe*) brings together European academic, research centres and private company with the primary aim of developing a generic quantitative spatial risk assessment to describe the introduction and transmission of exotic animal pathogens within Europe.

Case studies are being used in the SPARE project to focus the work.

Objectives

To select the case studies, we developed a risk-ranking framework (RRF) that uses objective evidence to rank exotic animal pathogens according to specific criteria.

How does the risk ranking framework work?

The RRF is a semi-quantitative, programmed (formulas embedded) tool in Excel that enables experts to:

1) gather available **data** and **information** about pathogens of interest
2) **score pathogens** according to agreed **assessment criteria** (taking into consideration "uncertainty" related to experts judgment)
3) assign **weights** (1 to 5) to each assessment criteria based on the perceived importance of each criteria

Assessment criteria (weight):

1.Zoonotic potential (weight = 2)

2.Number of domestic species involved (w. = 2)

3.Wildlife reservoir (w. = 3)

4.Expected probability of entering EU *(w. = 4)*

5.Potential impact on production *(w. = 2)*

6.Impact on international trade *(w. = 1)*

7.Pathogens targeted by projects in EU (w. = 2)

8.Expression of interest for a specific disease from the funding body (w. = 3)

9.Expected data availability (w. = 5)

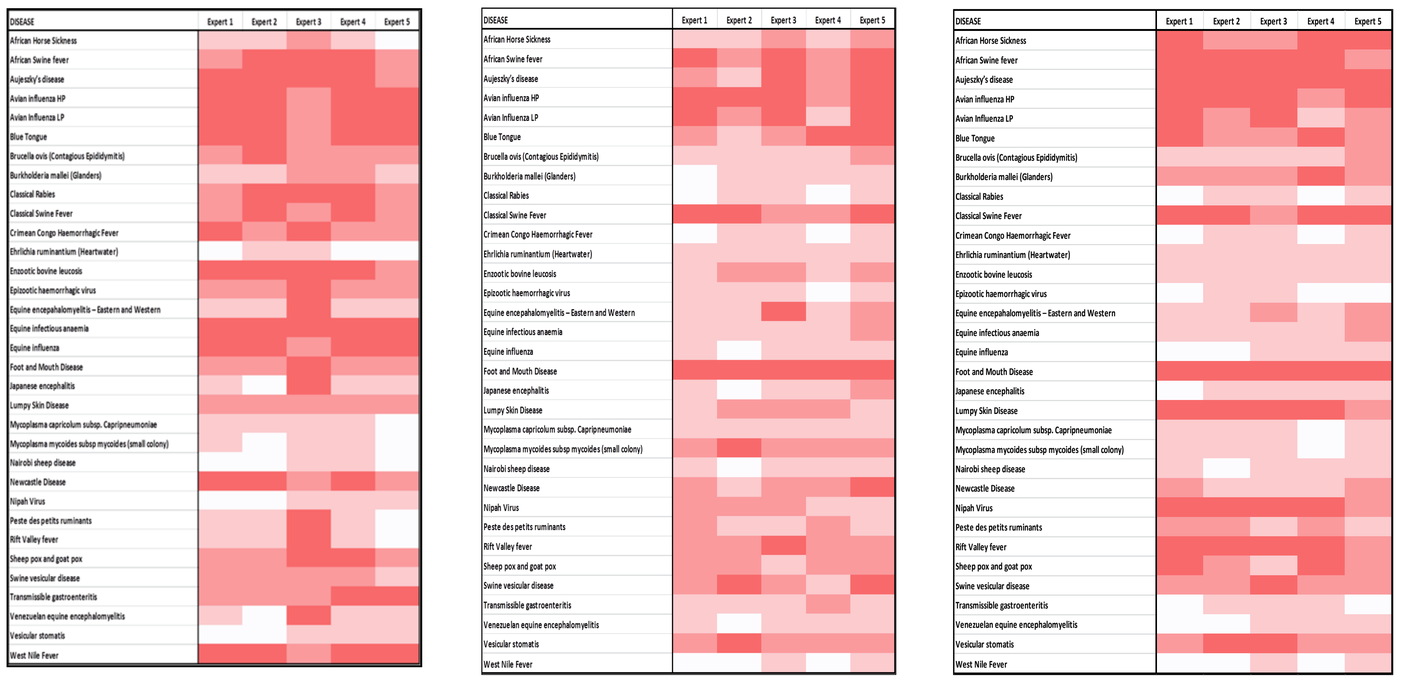

Figure 1: heatmaps of results of experts elicitation process for the 3 criteria. Table shows a remarkable agreement between 5 experts. (Legend: Negligible=white; High=dark pink)

Results

An initial list of **33 exotic pathogens** were qualitatively assessed by experts against the assessment criteria 1-7. From the initial list, the top **13 pathogens** were further assessed considering their relevance as case studies for SPARE (criteria 8 and 9). The results of the second stage of the process concluded that the most appropriate case study pathogens for SPARE were ***bluetongue***, ***classical-swine-fever*** and ***rabies*****.**

The propose framework has proved to be a flexible, relatively fast and simple to use tool. It fulfilled satisfactorily its scope in SPARE. Due to its flexibility we believe this framework may represent a valid alternative to prioritize pathogens especially in a data scarce environment. Further development as Shiny application in R are being considered.

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