

# 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 and private institutes with the primary aim of developing a generic quantitative spatial risk assessment to describe the introduction and transmission of exotic animal pathogens within European Union (EU).

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

### Assessment criteria (weight assigned in SPARE):

1. Zoonotic potential (weight = 2)
2. Multiple 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)

### Expected probability of entering EU



### Potential impact on production at EU level



### Potential impact on international trade



**Figure 1:** Heatmaps of results of experts elicitation process for the 3 criteria. The tables show remarkable agreement between the 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 proposed framework has proved to be a flexible, relatively fast and simple to use tool. It fulfilled its scope in SPARE to assist in prioritising case studies for further research. Due to its flexibility we believe this framework may represent a valid tool to prioritize pathogens (i.e. for enhanced surveillance) especially in a data scarce environment. Further development as a Shiny application in R is being considered.