

**Approaches to the prioritisation of diseases:  
A worldwide review of existing methodologies for health priority settings**

*DISCONTTOOLS Project  
Disease Control Tools  
Work Package 2 “Disease prioritisation”*

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## 1. Introduction

The objective of this review is to scan for existing methodologies worldwide in order to adopt an optimum approach to the prioritisation of a list of Animal Diseases in the DISCONTTOOLS project.

From ETPGAH Action Plan, it was agreed that a specific priority setting process is important to provide clarity over priorities and to ensure the successful outcomes from research funding. An important outcome of the prioritisation exercise will be the appropriate targeting of research funds to the diseases in the defined priority areas. In the longer term outcomes will include better-focused research into those areas where new tools and methods for control have a priority and improved public and private sector funding of research.

The objective is to develop and deliver a comprehensive, harmonised and validated methodology for the prioritisation of infectious animal diseases. This tool will allow the transparent classification of disease using a risk-based animal disease prioritisation model. It is difficult to allocate diseases into a simple classification as the large number of variables make a prioritisation a challenge.

Approaches to the prioritisation of diseases have already been developed by various organisations with different models and goals. In this review, 4 projects (DG SANCO/CVO, Defra, RIVM and ETPGAH) are examined along with 4 articles (**Joanna McKenzie and al.**, NZ, “Development of methodology to prioritise wildlife pathogens for surveillance”; **Kraüse and al.** – GER – “Prioritisation of infectious diseases in public health”; **Jo-Anne Doherty** – CA – “Establishing priorities for national communicable disease surveillance”; **WHO Guideline** on “Setting priorities in communicable disease surveillance”).

## 2. Information gathering

Necessary information to conduct this review was gathered from different techniques and sources. Initial scanning involved performing internet web searches on items such as ‘prioritisation of diseases’ ([www.google.be](http://www.google.be)) and visiting the websites of related organisations.

Searches on peer reviewed literature were conducted using the PubMed database and Elsevier website. DISCONTTOOLS Work Package 2 members on “Disease Prioritisation” were also asked to give some input on existing methodologies for priority setting.

### **3. Priority setting in selected organisations and articles**

#### **3.1 Non-paper on PRIORITISATION OF ANIMAL-RELATED THREATS AND BIOSECURITY - COUNCIL OF THE EUROPEAN UNION – Brussels, 22 May 2008 – Ref: 9536/08, ADD 1**

##### **3.1.1 Objectives**

This non-paper was developed in partnership with CVOs. This project was a part of Pillar 1 of the Community Animal Health Policy (CAHP). The objective was to prioritise actions – when, how, why, where? Should action be at an EU level, Member State level or should the private sector act?

The focus of the work was to identify where the EU should act. The main aim was to build a global tool for assessing priorities in all animal-related threats in order to better adapt EU legislation, allocation of funds and other resources and field actions (awareness campaigns, training, vaccination campaigns, external cooperation, etc), but also Member States relevant legislation and actions, as well as the role and actions of the private sector, all of which form part of the EU animal health strategy. This model is geared towards risk management and policy actions to better control diseases in Europe.

##### **3.1.2 Methodology**

The approach adopted was that the methodologies for the criteria should be defined precisely on the basis of scientific advice and practical experience, not only in the MSs or EU, but also in the world as a whole. 6 chapters were defined for scoring as follows:

- A (10 criteria) related to epidemiology,
- B (8 criteria) related to control measures,
- C (4 criteria) related to impact on public health,
- D (4 criteria) related to impact on economy,
- E (4 criteria) related to impact on society
- and F (4 criteria) related to impact on trade.

A and B provide answers to the questions "What is the risk?" and "Can we control it?", while C, D, E and F provide answers to the question "What is the potential impact of the threat?"

Each criterion has a coefficient so that the total of weighted criteria in each chapter is 10 (the total count of each chapter is therefore between 10 and 50). This ensures equality between the chapters, and each chapter can be subsequently weighted.

Once the risk managers (i.e. CVOs) had examined it in practical terms and drawn up the general framework, the scientists (epidemiologists, statisticians and risk analysts) were requested to give their advice in order to obtain reliable data, in particular regarding methodologies to quantify each criterion (from 1 to 5), mainly in Chapters A, B and C. Furthermore, as the number of criteria in the chapters varies, they decided that each criterion should be attributed a relative weight within the chapter in such a way that each chapter represents the same amount of points.

This model was a first step to an OIE/DG SANCO study on "Listing and Categorisation of Priority Animal Diseases, Including those Transmissible to humans" launched at the end of September 2008 with a final Draft due in early May 2009.

## **3.2 UK Animal Health & Welfare Prioritisation Decision Support Tool - 2006**

### **3.2.1 Objectives**

The principal objective of the Prioritisation Project is to provide an accessible evidence base to guide animal health and welfare policy. It seeks to ensure that the finite resources available for the prevention of disease and management of animal health and welfare, are targeted appropriately at those of most importance in the context of government policy and the Animal Health and Welfare Strategy (AHWS).

Profiles for specific diseases are available on the Defra website and Prioritisation Reports, produced by the Decision Support Tool, can be made available. This is to enable stakeholders and the public to view evidence that has contributed to the setting of Government priorities and funding decisions. The Decision Support Tool has been developed to ensure a simple and transparent process demonstrating how information brought in from the evidence base is combined to produce Prioritisation Reports.

### **3.2.2 Methodology**

A 'profile' for each disease captures defined data from which the tool calculates, for each disease considered, a score for the 'risk and epidemiology', and a score for the disease's impact on public health, international trade, animal welfare and 'wider society' (rural economy, biodiversity, environment), derived from 39 key criteria:

#### **Public Health Impact:**

- How bad human disease is/might be
- Uncertainty as to public health significance
- Costs of human disease
- Human attributable risk or exposure + extent GB based

#### **Animal Welfare Impact:**

- Number of individual animals affected
- Welfare impact: Five Freedoms + duration
- Welfare impact of control measures
- Extent of excess suffering (due to either the disease or the planned controls)

#### **International Trade Impact:**

- Government effort
- Legal risk
- Extent of impact on industry sector (potential extent for exotic diseases)

#### **Risk and Epidemiology:**

- Likelihood of an unaffected holding becoming affected
- Rate of spread (potential rate for exotic diseases)
- Extent to which the keeper or government can control

The analytical module and the profiles database went live on the Defra intranet in March 2008; these automate the prioritisation process and will generate scores to show the relative importance of each disease profiled, and reports of selected data about diseases. These reports provide supporting documentation to aid resource allocation decisions, and are the basis for briefings that can draw on the wide range of information in each profile.

### 3.3 RIVM project - Priority setting of emerging zoonoses - 2006

#### 3.3.1 Objectives

The RIVM project is focused towards zoonosis and public health. This project, initiated by the Dutch Food and Consumer Product Safety Authority, was started in 2006 after the incursions of SARS and AI in the Netherlands. Its aim was to better inform the government and help define policies.

#### 3.3.2 Methodology

The RIVM compared semi-quantitative and a quantitative approaches bearing in mind the objective of transparency and objectivity of the model.

The main steps were as follows:

- **Selecting agents** – through literature and expertise consortium
- **Establishing criteria** (risk aspects)
  - Limited number
  - Expressed in natural units
  - Consortium with steering committee
- **Operationalising criteria**
  - 4-5 classes (point estimate and range)
  - Evaluation of all agents: simple decision rules; current situation
  - Consortium
- **Weighing criteria**
  - Panel session with policy makers
  - Ranking of hypothetical zoonoses according to perceived threat
- **Data analysis and reporting**
- **Information management system**
  - Improve data
  - Update information
  - Scenario analysis

The RIVM selected 9 categories of scores (1. Probability of introduction, 2. Spread in animal reservoir, 3. Economic costs, animals, 4. Transfer from animals to man, 5. Spread in human reservoir, 6. Severity of human illness, 7. Case-fatality ratio human, 8. Economic costs, human, 9. Perception). Panels of experts were used to obtain information for weighing criteria, so that weights reflect policy choices of the Dutch government. The experts were asked to rank hypothetical zoonoses and repeated the exercise after 2 weeks.

The RIVM concluded that Priority setting is a multidimensional issue, the ranking depends on the criterion used and that a quantitative and systematic approach is necessary to ensure objectiveness. At the end of 2008 data were not complete, but data needs were about to be prioritised. The method was in a validation phase where international collaboration was requested to speed-up the process.

### **3.4 ETPGAH Action Plan - 2007**

#### **3.4.1 Objectives**

The objective identified was to facilitate and accelerate the development and distribution of the most effective tools for controlling animal diseases of major importance to Europe and the rest of the world, thereby improving human and animal health, food safety and quality, animal welfare, and market access, contributing to achieving the Millennium Development Goals. This exercise was designed to help funders focus research in a manner which would allow the objectives of the ETPGAH to be met.

#### **3.4.2 Methodology**

Working Groups of the ETPGAH developed a first list of 24 criteria for a prioritisation model. The main headings were as follows:

- Epidemiology and risk (8 criteria)
- Impact on wider society (5 criteria)
- Impact on public health (3 criteria)
- Impact on international trade (1 criterion)
- Control measures (7 criteria)

The aim was that expert groups by disease will fill in the scoring table (with score ranging from 1 to 5 and no weight applied) to sort out a prioritised list of diseases. This task was previously identified by the stakeholders in the ETPGAH Action Plan.

The ETPGAH created “Disease information sheets” by disease to gather information on all the important diseases they listed (46 diseases) and “gap analysis sheets” to identify areas where tools are lacking or could be improved.

This work constitutes the basis for the DISCONTTOOLS project tasks and deliverables.

### **3.5 Article entitled “Development of methodology to prioritise wildlife pathogens for surveillance” - Joanna McKenzie, Helen Simpson, Ian Langstaff – EpiCentre, Massey University, New Zealand - 2007**

#### **3.5.1 Objectives**

The aim of this project was to develop and evaluate methodologies for prioritising pathogens for surveillance in wildlife species in New Zealand. This should allow an improvement in the previous strategy for wildlife disease surveillance in New Zealand, developed in 2004-2005 and provide the government with a framework for conducting surveillance on the basis of prioritised pathogens and diseases in wildlife. A new risk analysis approach using the OIE Import Risk Analysis Framework was developed. A simplified system called ‘rapid risk analysis’ was also created.

#### **3.5.2 Methodology**

The Project followed a three-step process as follows: hazard identification, risk assessment and pathogen ranking. Wildlife species were divided into taxonomic groups: birds, marine mammals, bats, amphibian, reptiles, freshwater fish, non-native mammals and macro-invertebrates.

The Project chose a semi-quantitative scoring approach as opposed to a fully quantitative approach due to a lack of information on the epidemiology of many of the pathogens. Two scoring scales were used a 1-4 scale and a Leikart scale from 1 to 5 when better differentiation was needed.

Probabilities were defined to handle the probability of entry to New Zealand (release assessment) with scores of 0.2, 0.4, 0.6, 0.8, 0.9 and 1. Scores ranging from 0.2 to 0.8 constituted 4 options representing the probability of a pathogen entering New Zealand and scores 0.9 and 1 were used to represent pathogens that were likely to be present but undetected.

To take into consideration the likelihood of spread to population of interest in the country (exposure assessment), two main estimators/criteria were defined: exposure or likelihood of spread (LOS) and consequences of spread (COS).

Wildlife disease experts were asked to score pathogens for the different species. To standardise the results, independent risk analysts were sent the scoring framework and examples of risk assessment for comment and improvement.

They concluded that their model was working well and they ended up with the top 20 exotic pathogens and the top 10 endemic pathogens. However they highlighted that concerns exist about the use of semi-quantitative approaches to risk management such as a lack of transparency. Peer-review was suggested as a way of reducing subjectivity in the model.

### **3.6 Article entitled “Prioritisation of infectious diseases in public health”- Kraüse and the working group on prioritization at the Robert Koch Institute, Germany – Oct 2008**

#### **3.6.1 Objectives**

Following a previous prioritisation exercise, this project aimed at updating and improving the methodology via an international publication to collect suggestions for improvement. One of the challenges the Project identified in Public Health is that infectious disease control covers a wide range of pathogens requiring diverse methods of prevention and control. Furthermore the variability in occurrence and severity of the diseases and the scarce resources for research, surveillance and other public health activities, were highlighted. It was concluded that the rational allocation of resources is of great importance.

#### **3.6.2 Methodology**

The Project started with literature searches in Medline using the search terms ‘prioritization’ or ‘priority’ and (‘surveillance’ or ‘infectious diseases’ or ‘public health’). The researchers used presentations from the EAN workshop on “New tools for early warning” that took place in Lyon on 6 and 7 February 2004. They first compared all the different methods before establishing a list of pathogens based on their importance in the country, in Europe and the world.

Every pathogen was rated according 12 criteria with the following main headings:

- Burden of disease (3 criteria)
- Epidemiologic dynamic (3 criteria)
- Information need (4 criteria)
- Health gain opportunity (2 criteria)

For each criterion a score of +1, 0 or -1 was given. Each criterion received a weight by which the numerical score of each criterion was to be multiplied. The weights applied were defined by asking participants to rank the 12 criteria in a sequential order with 12 being the most important and 1 being the least important. An average was computed on each criterion, defining its weight. The total weighted score per pathogen was finally normalized to allow comparison with the unweighted total score. The Project compared results with and without weights applied and demonstrated the importance of weighting. A conclusion was that the objectiveness of the model seemed improved by weights when assessed independently of, and prior to, scoring.

This model emphasized standardization of the results to better ensure transparency and reproducibility. They concluded that a five-tiered scoring scale could help better differentiating the final scores, that the list of criteria has to be limited and that weighting is important for differentiation and objectiveness reasons.

### **3.7 Article entitled “Establishing priorities for national communicable disease surveillance”- Jo-Anne Doherty, MSc, ACE Subcommittee on Communicable Diseases – Laboratory Centre for Disease Control, Canada - Jan-Feb 2000**

#### **3.7.1 Objectives**

The objectives of this project were to ensure national surveillance of major infectious diseases that threaten the health of Canadians; to support the development and evaluation of programs in place or proposed; to ensure the participation of Canada in the global surveillance of specific health threats; and to determine the best use of human and financial resources in the prevention and control of communicable diseases.

#### **3.7.2 Methodology**

The priority setting process involved several steps: establishing the criteria; subdividing each criterion into levels; assigning points to each level within each criterion; summing the points and assigning a total score to each disease; ranking the diseases from highest to lowest score; and determining a cut-off point that would allow the inclusion and exclusion of diseases.

The subcommittee established 10 criteria to measure the importance of each disease. Each criterion was assigned a score from 0 to 5 points based on the subcommittee’s consensus. The majority of the criteria had a scoring schema of 0, 1, 3 and 5. The exceptions included ‘incidence’ with a scoring schema of 0, 1, 2, 3, 4 and 5; ‘severity’ and ‘socioeconomic burden’ with a scoring schema of 1, 3 and 5.

List of criteria was as follows:

- International considerations
- Other sectors involvement
- Incidence
- Severity
- Potential to spread to the general population
- Socio-economic burden
- Preventability
- Potential to drive public health policy
- Risk perception
- Appearing to or changing patterns over the past five years

The Project concluded that what is really important in a prioritization exercise is not the absolute number of points given to a disease, but rather the relative position of the disease to others and the cut-off point chosen.

### **3.8 WHO Guideline on “Setting priorities in communicable disease surveillance” - 2006**

#### **3.8.1 Objectives**

This paper is a Guideline entitled “Setting priorities in communicable disease surveillance”. The guideline aims to assist public health professionals at national level in the process of prioritisation of communicable diseases/health events for public health surveillance.

The main objective of the prioritisation exercise is to make the best use of limited human and financial resources for disease surveillance, taking into account changing needs. Priority setting is identified as necessary to ensure that both planning and resource allocation are rational, explicit and transparent.

#### **3.8.2 Methodology**

WHO recommend that the prioritisation exercise should start with the appointment of a steering committee, which will do most of the preparation. Key steps are defined with the creation of workshops to plan the implementation. Another important step is to agree on a defined list of diseases through literature, existing surveillance data, advice of experts and the review of previous outbreaks in the country, neighbouring countries and internationally.

A list of criteria for consideration is highlighted in the guideline such as ‘Present burden of disease’, ‘case fatality rate’ and ‘epidemic potential’. There should be 5 to 8 criteria allowing scores from 1 (not important) to 5 (most important).

Emphasis is given to the preparation of the score sheet and the disease facts sheet (current knowledge on the disease). This guideline principally gives advices on the process itself but not precise information on the scoring model. Advice is very useful as it gather information from various experience.

The guideline specifies that it is essential to have a common understanding of the criteria and the constitution of the disease list. Weighting is considered to be useful to better differentiate the results.

#### 4. Conclusion

This review helped us to develop our prioritisation model for 45 diseases included in the DISCONTTOOLS project. Work Package 2 has taken the lead on this exercise. Lessons have been learned from the various experiences of other organisations and projects such as those studied in this paper.

The main remarks following this review are the following:

- Criteria have to be **explicit, measurable** and **objective**
- The Priority-setting process should be **transparent** and **open to criticism and revision**
- It is better to list **specific diseases** rather than syndromes or groups of diseases

The main steps we decided to follow are:

- Establishing a list of diseases
- Gathering information on diseases
- Establishing the criteria
- Choosing a scoring system and providing guidance on scoring
- Consideration of applying weights
- Summing scores for a total score per disease
- Ranking the diseases from highest to lowest
- Determining a cut-off point to allow exclusion and inclusion of diseases

Difficulties that need to be considered include:

- Finding individuals able to prioritise a broad range of diseases without bias
- Mechanism for establishing weights
- Choosing a 3-, 4- or 5-tiered system for scoring
- Ensuring that the model evolves – comments, improvements, new requirements and information need to be incorporated.

Finally the important questions that should be addressed before starting and/or for improvement are the following:

- Does the list contain all relevant pathogens/diseases?
- Do the criteria cover the relevant characteristics for prioritisation? Are they not redundant or strongly dependent?
- Which system to use for each category (3-, 4- or 5- tiered?)
- Is the guidance for scoring clear?
- Is the weighting rational?
- How can we establish representative groups of experts?

The DISCONTTOOLS prioritisation model has been substantially developed and will be tested by experts with regard to consistency in the coming months.


**Annex 1: Table of comparison of the 8 prioritisation methodologies**

Reference	CVOs	Veterinary surveillance: Prioritisation Project	ETPGAH	Priority setting of emerging zoonoses	Joanna McKenzie et al.	Krause et al.	Jo-Anne Doherty	WHO guideline on setting priorities
Country	EU	UK	EU	NL	NZ	GER	CA	World
Year	Feb 2008	2006	July 2007	2006	2007	2008	2000	2006
Organisation	European Commission DG SANCO	Defra	ETPGAH	RIVM	EpiCentre Massey Univ	Robert Koch Institute	Centre for Disease Control, Health Canada	WHO
Prioritisation objective	Risk management.	Economic considerations. AH and Welfare policies	Risk assessment. To develop new tools for control	Public Health	Surveillance strategy	Epidemiological research and surveillance	National surveillance.	Disease surveillance with changing needs.
Number of diseases	No	25	46	?	82 pathogens	85	43	No
Number of criteria	34	40	24	9	3	12	10	Should be 5 to 8 criteria
Scoring system	5-tiered	5- and 3-tiered	5-tiered	4- and 5-tiered	4-tiered	3-tiered	3- and 4- and 5-tiered	5-tiered
Weighting applied	Systematically	Relative weight Systematically	No	Perceived threat	No	Systematically	No	Ranking the different criteria.
Methodology of collecting opinion	Working Party of CVOs	Workshops	Workshops Questionnaires.	Steering Committee Consortium	Electronically	Delphi	Subcommittee	Workshop with one facilitator
Number of participants	9	23 UK organisations	30	?	?	11	?	No
Type of participants	CVOs	Government and non-government stakeholders	Academia/research Industry Regulators users	?	Wildlife disease experts project team members	Epidemiologists National Public Health Institute		No