



## An integrated process and management tools for ranking multiple emerging threats to animal health

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### ABSTRACT

The UK's Department for Environment, Food and Rural Affairs supports the use of systematic tools for the prioritisation of known and well defined animal diseases to facilitate long and medium term planning of surveillance and disease control activities. The recognition that emerging events were not covered by the existing disease-specific approaches led to the establishment of the Veterinary Risk Group (VRG), constituted of government officials, and supporting structures such as the Risk Management Cycle and the Emerging Threat Highlight Report (ETHiR), to facilitate the identification, reporting and assessment of emerging threats to UK's animal health. Since its inception in November 2009 to the end of February 2011, the VRG reviewed 111 threats and vulnerabilities (T&V) reported through ETHiR. In July 2010 a decision support system (DSS) based on multi-criteria-decision-analysis (MCDA) improved ETHiR to allow the systematic prioritisation of emerging T&V. The DSS allows the regular ranking of emerging T&V by calculating a set of measurement indices related to the actual impact, possible impact on public perception and level of available capabilities associated with every T&V. The systematic characterisation of the processes leading to the assessment of T&V by the VRG has led to a consistent, auditable and transparent approach to the identification and assessment of emerging risks. The regular use of MCDA to manage a portfolio of emerging risks represents a different and novel application of MCDA in a health related context.

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### 1. Introduction

Organisations in many domains recognise the increasing need to rationally allocate scarce resources to the management of emerging risk events (Anon., 2009a). The UK agricultural administrations are not an exception: early identification of new animal health threats is one of the

cornerstones of the UK Veterinary Surveillance Strategy (Defra, 2003), translated in the development of a risk and impact-based prioritisation process. To this end, the UK Department for Environment, Food, and Rural Affairs (Defra) has developed and is now piloting a structured and systematic approach to the prioritisation of diseases, known as the "Disease briefing, Decision support, Ranking and Risk assessment database" (D2R2) (Defra, 2004b). D2R2 facilitates the long and medium term allocation of resources towards, for example, surveillance and disease preparedness. D2R2 assesses *known* diseases and relies on a set of common criteria, such as the reasons

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for government intervention (Defra, 2004a), and a comprehensive characterisation of the conditions and control measures (i.e. profiling) to produce a rank order of diseases. To date, over sixty diseases have been profiled and ranked. Elsewhere, similar exercises have been conducted for diseases of public health importance. For example, Krause (2008) and subsequently Gilsdorf and Krause (2011) reported the application of a weighted multi-criteria approach to 85 pathogens of public health importance leading to pathogen-specific scores that allowed their ranking.

Whereas disease profiling and prioritisation is a valid exercise that allows systematic comparisons to support strategic resource allocation, it cannot capture all possible manifestations of the hazards given a specific setting and risk pathway. Additional steps to capture this heterogeneity would allow the regular update of the strategic prioritisation tool, D2R2 in our setting, and ensure comprehensiveness in its scope.

In 2009, to address the recommendations of Defra's Science Advisory Council and in response to the Anderson Review of the 2007 foot-and-mouth outbreak in England (Anon., 2008), the Veterinary Risk Group (VRG) was established to regularly monitor, rank and escalate for action emerging animal health related risks. The VRG, in effect, was formed to help Defra to avoid the four most common issues affecting organisations in their management of emerging risks (Anon., 2009a), namely: (i) the lack of alignment of risk management practices within the organisation's regular processes, (ii) the insufficient resource to interpret risk information, (iii) communication shortfalls within the organisation and (iv) the scarcity of adequate and fit-for-purpose methods to measure risk. For the latter, the VRG chose multi-criteria-decision-analysis (MCDA) (Keeney and Raiffa, 1993; Belton and Stewart, 2002) techniques to facilitate the systematic comparison of threats leading to their prioritisation.

The use of MCDA in health settings is not new. Earlier works include the application of MCDA to the evaluation of health interventions and their rank ordering in multiple settings (e.g. Baltussen and Niessen, 2006; Felli et al., 2009; Mourits et al., 2010; Walshe and Burgman, 2010). Hongoh et al. (2011) reviews the use of MCDA together with geographic information systems for the management of diseases, and shows a different application of MCDA, that of the geographical area based assessment for a given threat. By contrast, our work uses MCDA as a means to help prioritise resources and build up capabilities to regularly manage a portfolio of emergent risks, rather than to choose a single best option or focus on a single event. To our knowledge this represents a different and novel application of MCDA in a health related context.

This paper describes the structures and processes created for the identification and advice on management of emerging animal health related threats in the UK. Specifically, the paper describes and discusses the characterisation and management of emerging risks by the VRG since its inception in November 2009 and the pilot application of MCDA techniques to a reduced set of emerging threats from July 2010.

## 2. Materials and methods

### 2.1. Risk identification process

A common constraint in many organisations is a disconnected approach to the identification, evaluation and response to emerging events, without formal integration with other strategic decision-making processes (Anon., 2009a). Within Defra, the Risk Management Cycle (RMC), a suite of tools, structures and processes guarantees a systematic and integrated approach to the management of emerging risks.

As part of the RMC, the VRG manages emerging animal health related threats and vulnerabilities (T&V) reported by a number of risk managers (RMs) within government. These managers are officials responsible for risk portfolios. The following portfolios have reported regularly to the VRG since its inception: International Disease Monitoring, Import Risk, Animal Demographics, Early Warning Surveillance, Wildlife-Aquatic and Zoo Animal Issues, Zoonoses, and the Veterinary Exotic Notifiable Diseases Unit (VENDU). These are the main areas in which unexpected threats that require the development of policy may arise. This list is not comprehensive as other risk portfolios exist within government, for example, those dealing with tuberculosis or transmissible spongiform encephalopathies. These two portfolios were not part of the initial pilot phase here reported, although later joined the group of risk portfolios reporting to VRG at the time of writing (Autumn 2011).

The definition and nature of the risk events to be reported to the VRG were discussed at length within the group and RMs. The consensus was that *threats*, defined as "a risk resulting from a newly identified hazard to which a significant exposure may occur or from an unexpected new or increased significant exposure and/or susceptibility to a known hazard" (EFSA, 2011), and *vulnerabilities*, defined as "a state that exists within a system that could lead to potential damage to the system by a hazard event", would be reported to the VRG. The case definition was narrowed to include T&V of technical nature only. That is, resource related issues, for example shortages in staff within the areas of responsibility of RMs, were excluded from submission to the VRG.

Every month RMs report all emerging T&V within their risk portfolio via the completion of an Excel®-based template, named the Emerging Threat Highlight Report (ETHiR), collated by the VRG's secretariat. The information provided by the RM through ETHiR contains: (i) a brief description of the threat or vulnerability; (ii) a description of the risk pathway that reflects the RM's perception of the possible route and manifestation of the threat or vulnerability; (iii) the RM's interpretation of the threat's relevance against the reasons for government intervention; and (iv) the risk mitigation measures proposed or put in place by the RM within his/her portfolio.

Once all the monthly T&V are compiled through ETHiR, the VRG may then agree with the RMs assessments, make recommendations on mitigating actions, or request further information from the RM before submitting the VRG report of the month to the four CVOs' (Chief Veterinary Officers

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