A Generic Action Plan against the Invasion of the EU by an Emerging Pathogen in Wildlife - A WildTech Perspective¹

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Abstract – In recent years, several animal diseases caused major crisis within the European Union, for example: Foot and mouth disease, Avian Influenza, Bluetongue. Over the years, the European Union and its member states set up several management tools, including surveillance, notification process, diagnostics and contingency planning in order to contain, control and eradicate animal diseases. Wildlife plays a growing role in the origin of zoonotic and livestock diseases. An emerging or re-emerging disease in wildlife could have dramatic consequences threatening domestic animals or human health. A generic action plan for the control of wildlife infections has to be integrated in tools and organizations already in place for the containment, control and eradication of domestic animal diseases and zoonoses. We present a tentative generic plan based on European and International institutions guidelines, bringing together legal surroundings, financial resources, governance system, material resources, procedures and methods required, the instructions of the coordination, cooperation and communication. This action plan is designed to be functional, easy to read and use; it should allow, in time of crisis, to quickly contact relevant people and act efficiently. The success in the disease control and eradication will rely on the consultation and the coordination of different bodies concerned by wildlife management in Europe. Then, the existence of such a tool should be a real progress in case of emerging disease outbreaks in wildlife.

Keywords – wildlife, emerging disease, European Union, contingency plan.

1. Introduction

In recent years, several animal diseases caused major crisis within the European Union (EU) e.g. Foot and Mouth Disease in 2001, Avian Influenza in 2003, Bluetongue in 2006. Diseases do not respect borders and can spread very fast from a country to another. To prevent this spread and its potentially dramatic consequences, containment, control and eradication of animal diseases are major objectives served by a range of tools, including surveillance, notification process, diagnostics and Contingency Plans (CPs). Wildlife plays a growing role in the origin of zoonotic and livestock diseases (Gortazar et al., 2007). An emergent or re-emergent disease in wildlife could have dramatic consequences threatening domestic animals or human health. So it is essential to prevent and organise control and management of these diseases at European scale. In the framework of the WildTech European project, we prepared a generic CP in the event of an outbreak caused by an infectious pathogen introduced into Europe and spread by wild animals. The first part of this document, presents the existing notification system in the EU, the second one summarises the guidelines from the EU and international organisations, regarding CPs. The third part describes the specific characteristics of wildlife to be taken into account to prepare an emergency plan. Finally the last part is a detailed proposal of a generic action plan to manage a wildlife disease outbreak in the EU. This generic action plan represents a frame to be adapted and updated, according to the particular conditions prevailing.

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Figure 1: Steps of the notification and management process

if wildlife pathogens outbreaked and merged (which disease, which wildlife species, which extent of the event?). The CP is designated to be functional, easy to read and identifies how to be organised to face the problem or who to contact in case of a crisis. We present in the following paragraphs the steps and main aspects of this plan.

2. Animals diseases notification in the EU

Notification of disease outbreaks is one of the fundamental duties of the World Organisation for Animal Health (OIE) or EU memberships. The Member States (MSs) have to make an official declaration (i.e. notification) when an animal disease appears in the country. At the EU scale, this requirement appears in the Directive 82/894/EEC (European Commission, 2012) which stipulates the criteria for notification of animal diseases outbreaks, to the European Commission (EC).

We present below the most relevant aspects that are to be considered in general, but are of great importance as far as wildlife can be concerned.

2.1. Disease apparition

When veterinarians or animal breeders observe signs of a disease in animals, they initiate diagnostic testing and declare the disease outbreak to a local competent authority, e.g. the veterinary service. These local authorities are in charge to verify information and to order laboratory confirmation. After confirmation of the outbreak by a reference laboratory, the information is relayed to national competent authorities.

Once they are informed, and provided that the Country affected used to be previously free of the disease, the national MS authorities have to notify the outbreak to the EC and to the OIE.

In a more general scope, to prevent emerging diseases, MS authorities have to notify a new disease with significant morbidity or mortality or with a zoonotic potential, and they also have to inform on epidemiological significance of the event, to the other MSs, namely their neighbours.

2.2. Disease notification process

Each MS might have to notify directly to the EC and through the EC to other members, within 24 hours. This notification will be based on the EU Animal Disease Notification System (ADNS) that will ensure the quick information hand-over on animal disease occurrence; at international level, the World Animal Health Information System (WAHIS) must be alerted as well.

2.3. Decision process

When the EC receives a disease alert, the Standing Committee on the Food Chain and Animal Health (SCFCAH) is alerted. The EC describes the circumstances to the committee and the control measures to be implemented, which were submitted by the MS. The SCFCAH provides a technical recommendation to the EC.

If the measures are in accordance with the committee recommendation, the EC can directly take the decision, implement the project and communicate to other MSs. If measures are not in accordance or if the committee does not give a recommendation, the EC has to submit the project to the Council for the European Union (CEU). The CEU shall adopt the appropriate measures by a qualified majority. This decision process is efficient when the alert deals with a listed disease for which CP and control measures already exist. In this case the EC and the SCFCAH check if foreseen measures match with the situation and then approve it, possibly with some modifications.

If MSs in the EU are exposed to a new disease, the Directorate General for Health and Consumers (DGHC) in agreement with the SCFCAH, will request the support of experts’ groups to strengthen the decision; for example: the Advisory Group on the Food Chain and Animal and Plant Health (AGFCAPH), the European Food Safety Authority (EFSA), the Community Veterinary Emergency Team (CVET) or, as far as human health is concerned, the European Centre for Disease Prevention and Control (ECDC). The process is complex, it can appear slow when the disease is highly contagious, or rapidly transmitted, and when index cases are difficult to detect.

2.4. Communication process

During the notification process, the MS should communicate to the EC which will relay the information to other MSs. The communication is done through ADNS and also with the contribution of the ECDC in case of a disease communicable to humans.

This communication is important when diseases are confirmed or when an already present disease shows a sudden spread. The EU and OIE encourage countries to prevent diseases apparition and to be ready to face crisis by preparing CPs. The general process of response to an animal disease outbreak is presented in figure 2.
3. Guidelines for contingency plans preparation

Containment, control and eradication of animal diseases are major objectives supported by a range of tools including surveillance, notification process and diagnostics. According to the EU strategy planed for the years 2007 and 2013, disease outbreaks were a permanent threat that needed a proactive approach. Considering that "prevention is better than cure", the third pillar of the EU strategy is oriented towards surveillance and crisis preparedness. In this aim, the EU encourages countries to implement CP to limit sanitary and economic consequences. A CP is a systematic approach consisting in the identification of actions that should be done in case of disease outbreaks in order to get a quick and accurate response. CP can be used in the long term for disease outbreak prevention, control measures preparation and disease eradication and in the short term for limiting disease diffusion. In the EU, the MSs must set up CPs for the animal notifiable diseases. The setting up of a CP for Foot-and-Mouth Disease was the first obligation decided by the EU, in 1991, after vaccination was stopped. CPs must be submitted to the EC for approval following SCFCAH recommendation. In order to help countries to create CPs, the EU, the OIE and the Food and Agricultural Organisation (FAO) edited guidelines. These guidelines were described in our Deliverable 6.6 (Béneult et al., 2013). Using this background, Figure 3 summarises the main elements to be taken in account in a CP.

Figure 2: General notification process (inspired by ECFC, 2012)

Figure 3: Basic topics for writing a CP (OIE, 2012; FAO, 1981; European Commission, 2012)

The guidelines addressed different topics which constitute the basic elements for writing a CP. These topics are organized in a logical way which can be followed for
setting up the document. This was the outline followed to write our generic action plan, before introducing it, we have nevertheless to highlight the relevant characteristics of wildlife that differ from livestock.

4. Wildlife distinctive features

Wildlife presents distinctive characteristics (Artois et al., 2001 and 2003; Wobeser, 2007) that need to be taken into account for CP redaction. Among these characteristics, the most significant aspects are referred to in the below paragraphs, i.e.: inadequate regulation, and administrative responsibilities for wildlife incompletely defined (regulation), the number and diversity of species (multiplicity of species), the difficulty to obtain essential epidemiological information (demography and ecology), the validity of diagnostic tests, the extremely limited possibilities of managing movements, contacts and mass immunity of wild populations (prevention, control & eradication measures), and lastly, by comparison with livestock or human health management, the skillfulness recognition of professionals who are involved.

4.1. Regulation

In a MS, the administration responsible for wildlife management is usually the Ministry of the Environment, but the links between this Ministry and the Veterinary Authority are frequently remote. The attributions of the Ministry of the Environment do not generally include health or animal diseases. The official attribution regarding management of zoonotic diseases, when the reservoir host is a free living wild species, can be even more complex since human health has to be considered. The identification of the official body (Ministry of Environment, Agriculture or Health?) in charge of wildlife disease is therefore essential to allow establishing the necessary transversal contacts. In the EU, the principle of subsidiarity does not simplify the attribution of rules in the event of an outbreak of a new pathogen among wild animal populations in several countries, a coordination is necessary, but the role played by the EU has to be defined in parallel to the power of each country. With regard to legislation, the European Union gives the possibility to MS to react in face of concerning issues but there is no background information to prevent or manage in general health issues in wildlife.

4.2. Multiplicity of species

European Fauna has close to 1,300 vertebrate’s species, fishes excluded: 75 amphibians, 153 reptiles, 800 birds and 270 mammals (Fauna Europaea). In addition, not less than 200 infectious pathogens or parasites were identified by the WildTech project partners (Ciliberti et al., 2013). By comparison with the much less numerous domestic animal species, they present absolutely different biological characteristics and live in a large range of natural habitats. Life traits and natural history can dramatically influence the exposure and impact of pathogenic agents (e.g. breeding behaviour and seasonality, use of dens and crowding in resting places or roosts, dispersal and migration, sociality and contacts...).

4.3. Demographic and ecological data

The variables associated with incidence of an infection or disease, on the first hand, and the risk of transmission to targets (e.g. humans or cattle) on the second hand, are: the source population structure (by age, sex and social categories) and the population size and density. Both types of variables are extremely difficult to quantify in wildlife. It has to be expected that the management of infection in a free living animal population will require detailed ecological studies, involving specialists from various trainings, sometimes distant from medical or veterinary sciences (Artois et al., 2001).

4.4. Sampling and diagnostic tests

Representative samples of wildlife are difficult to obtain: available results often come from convenience samples, i.e. samples resulting from hunting (Wobeser, 2007); so far sport hunters generally are oriented at shooting healthy individuals. Sampling of diseased or crippled individuals is the duty of game keepers or similar professionals, when present. As for non game species such as bats or rodents, getting samples is only possible by asking to naturalist amateurs. A thorough assessment of the source population status is always difficult. The number of samples is always pulled down due to the time required, the cost of operations and the inaccessibility of the terrain. The most common bias in wildlife sample collection is the selection bias. Preventing a bias completely may be impossible; however, this must be kept in mind and dealt with when interpreting results.

4.5. Prevention, control and eradication measures

Prevention, control and eradication are major objectives in disease management. In this aim, four main approaches are available: prevention of disease apparition or action against causes (i.e. immunisation or treatment, respectively), manipulation of host population(s), action on the environment and action on human activities. As far as wildlife is a valuable resource, for the conservation of biodiversity at the herd, population, or genetic taxon level, safeguarding animal life must be integrated in the decision for prevention, control and/or eradication measures (Artois et al., 2011). In addition, environmental issues possibly resulting from field intervention (e.g. environmental contamination with chemical residues contained in lures) must be considered and kept at a minimum level (Ward et al., 2009). Relationships and possible contact between wildlife and domestic animals must be taken into consideration, especially for defining animal movement restrictions.
5. The tentative generic action plan

This action plan is intended to describe the appropriate response to the intrusion of an exotic pathogenic agent, across borders of the European Union. The resulting disease could match three situations:

- The disease is maintained in wildlife and impact wildlife population (disease of conservation interest),
- The pathogen is maintained in wildlife, at least temporarily, and can be transmitted from wildlife to humans (zoonoses),
- The pathogen is maintained in wildlife, at least temporarily and can be transmitted from wildlife to domestic animals (disease of veterinary and economical importance).

The transmission routes can differ from one host species to another. Each transmission route or combination of transmission routes will lead to a different risk assessment which will allow writing a specific action plan. In summary, the transmission routes to be considered can be:

- vector-borne,
- food-borne,
- water-borne,
- air-borne,
- transmitted to livestock or humans, by direct contact,
- transmitted to livestock or humans by liaison hosts (such as pets and commensal or synanthropic animals).

The response must reduce the infection transmission either at the source level (wildlife reservoir: Carter et al., 2009) or at the target level (livestock or humans), targeting the victim, the vector or the pathogen itself (Blancou et al., 2009). The response can be based on the limitation of source animal number, restriction of natural resources, and restraint of animal movements (Ward et al. 2009). In rare occurrences, the delivery of drugs or vaccine to wildlife could be considered.

The generic action plan is summarised in Figure 4 and detailed in the following paragraphs (a comprehensive description can be found in Béneult et al. 2013).
5.1. Legal and financial aspects

A sufficient financial, technical and human support to the action plan is required since wildlife outbreak management can be extremely complex and costly. Compared to the situation in domestic animals, field surveillance and control of wildlife infections are especially expensive. In addition to the cost of animal sampling, storing and diagnosing, there is extra fees related to working in a natural environment and to the frequent necessity to develop new tools (new vaccines or treatment, new delivery system, new diagnostic test, new recording system).

In some cases a specific regulation will be necessary, allowing that all the elements are gathered and applied through possibly coercive measures. In this circumstance the EU may allocate funds to help countries. The Decision 2009/470/EC sets out the conditions for such a financial contribution. The following financial supports may be considered:

- Up to the half of the costs for the slaughter and destruction of animals and for the cleaning, disinsection and disinfection of holdings and equipments;
- When vaccination is feasible, 100% of the cost of supply of the vaccine and 50% of vaccination campaigns.

The EU may also cover expenditures for writing a national CP, help reference laboratories as well as for elaborating a notification system. Decisions related to financial contributions are taken by the EC once the Standing Committee on the Food Chain and Animal Health (SCFCAH) has advised on it.

5.2. Crisis management and command chain

A command chain has to be established and has to be evident for all stakeholders, at all levels. In line with the EU guidelines on CPs, the organisation chart should contain:

- A Headquarter
- A crisis management team
- An advisory committee

The Headquarter has to manage the international and organisational aspect of the emergency while the crisis management team will implement and update the program. The EU management level should have a direct link with the affected Member State through a focal point. When specific skills are required to adapt the decisions to a particular situation, an advisory committee will be appointed by the CVET. The committee must include experts from the SCFCAH and from the AGFCAPH. Recognised experts in wildlife ecology and health will contribute as required. If the intrusive pathogen was to be zoonotic, this committee should be related to the ECDC. At the member state level, the crisis management will involve state services and other environment professionals working outdoor, in contact with wildlife. The national reference laboratory will be essential in the disease confirmation and follow up.

The Headquarter will have to play a significant role in helping countries to collaborate and to establish coherent and synergic action plans. Management consistency on each side of a border may result in an improved control.

5.3. Processes

An early detection of the outbreak is a key to the success of the management. Earlier the detection is, the best is the chance to limit the expansion of the epizootics. Surveillance is essential to be able to detect the emergence of a pathogen, either by an international vigilance and/or by a targeted surveillance in member countries. An absence of an outbreak detection or if it is delayed could have serious consequences, but a false alert, which would engage substantial resources in vain, may also be a serious concern. The alert should be given with care; confirmation of the index cases has to be done fast and with confidence.

5.4. Investigations

In a country affected by the outbreak, the animal health competent authority must lead, in real time, field investigations to monitor the geographical extent of the disease and its development under the supervision of the Headquarter through recommendations provided by the crisis team. For the index and following cases the recording of the ecological and epidemiological factors surrounding the event has to be described with precision.

The animal health competent authority must also attempt to identify the epidemiological, political and socio-logical, or material considerations associated with the outbreak likely to affect its management (for example: support or reluctance of the general public to destroy animals).

5.5. Confirmation

The ad hoc procedure must indicate the recommendations for sample collection and transport to appropriate laboratories. These procedures must be provided by the relevant reference laboratory to the MS wildlife focal point and the instructions will be sent to the field investigators. Should a reference laboratory confirm the diagnostic, the focal point has to initiate the notification procedure to the EC Headquarter under supervision of the Central Veterinary Officer. The notification will be made in accordance with the rules laid down by the ADNS system. Diseases subjected to the EU notification scheme as well as the required criteria are described in the Directive 82/894/EEC.

5.6. Response

The response must be based on the pathogen transmission routes, as listed above in order to moderate the infection transmission either at the source level or at the

\(^{2}\)Official recognition of a skill in wildlife health is a recurrent problem in the EU. European bodies such as ECDC, EFSA
target level. The response may involve direct or indirect control targeting the animal host or the pathogen itself. The response can be based on the limitation of animals, of resources and of animal movements. It can, also, involve the delivery of drugs or vaccine.

The control in essence consists in the mitigation of pathogen maintenance and in transmission in wildlife whenever possible. However, previous occurrences suggest that direct control in wildlife may be hard to implement and have mostly failed in the past\(^1\). A priority has then to be given to prevention and protection of targeted species: human and domestic stock.

Practical measures aiming at limiting the size of animal populations, restrain movements, limit reproduction or access to vital resources in order to mitigate pathogen maintenance and transmission in wildlife must be considered on a case-by-case basis, with extreme caution.

Action on maintenance host populations may consist in manipulating geographical distribution, reducing population size or in immunising/treating individuals; however, these approaches may turn out to be ineffective since ecological characteristics and life history traits (e.g. reproduction rate) of species may negatively interfere with the influence of these actions, or quickly compensate them.

Moreover, controversy and social concern often appear when wildlife has to be culled; hence this option must be considered as a very last alternative.

5.7. Follow up

During the earlier response stages, a follow up must be set up in order to consider and confirm the new cases occurring in wildlife, in domestic animals or in humans.

NB: The management of human and domestic animal cases is not addressed in the present document. However, the CP targeting an outbreak in wildlife has to be entirely integrated in the scheme of surveillance and response to animal health and zoonotic events.

Consecutively to any event, response must be evaluated by the crisis management team. Appropriateness and effectiveness of containment measures, timeliness of outbreak detection and response have to be assessed by the crisis management team with the expertise of the advisory committee. The MS wildlife focal point will provide all information necessary for the assessment. An outbreak report should be disseminated towards interested parties through ADNS. The updating of action plans shall result in improved experience and evaluation through the responsibility of the Headquarter.

6. Added value to the One Health Approach

Several of the diseases concerned by this action plan are zoonotic or livestock diseases; the risk of infection in these target species is dependant of the transmission of pathogens amongst humans and domestic or wild animals. The management and control of these diseases have to mobilize both human health and veterinary institutions. As far as wild species are concerned, either as reservoir or vector of diseases, the aim of our tentative action plan is to set up collaboration and good coordination between institutions related to the conservation of biodiversity and the preservation of human and animal health, well in the core of the one health paradigm.

7. Conclusion

The aim of our CP was to fill up a gap in the European Union regulation at the interface between human, animal and ecosystem health. It was designed to be functional, simple to read and use. Due to the diversity of possible pathogens, the variety of transmission routes and the multiplicity of wild species which are of concern, the plan have to stay general to cover possible risks. Basically, it was established as a catalogue of resources and rules to connect these. However, in case the EU was to face the threat of an intrusion it should allow to quickly set up investigation and preservation measures. The success in the disease control and eradication will rely on the consultation and the coordination of different bodies concerned by wildlife management in Europe. Then the existence of such a tool should be a real help in case of emergent disease outbreaks in wildlife.

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\(^1\) Fox rabies control in the western states of the European continent is an almost unique exception to this general rule.


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