AEEMA Meeting, March 24th, 2016: Epidemiologic investigation

Epidemiologic investigations: definition, scope, resources and situation

Calavas Didier

Epidemiologic investigations (EI) may be defined as the « area of epidemiology corresponding to the procedures applied subsequent to the occurrence of a health problem (case(s), outbreak(s) of disease) in order to identify the cause, specify the characteristics (aetiology, affected population and spread over time and space), determine the origin ("upstream investigation") and estimate the current and potential consequences ("downstream investigation") in order to draw up control recommendations for health managers ». The goal of EI is health management, *i.e.* the implementation of measures to control investigated health issues, although EI also helps to shed light on these diseases and reveal new topics of research. EI is implemented in two types of situations: those where the general epidemiological investigation approach has already been tailored by the risk manager to a specific disease, is covered by health regulations and benefits from a precise investigation protocol, and those where the general epidemiological investigation approach remains to be freely and specifically adapted by investigators to the health issue encountered.

Epidemiologic investigation: definition of a generic method for veterinary public health

Gay Émilie, Hendrikx Pascal & Calavas Didier

A generic method of outbreak investigation applied to animal health and food safety was developed by an expert group gathered by ANSES. This method includes 10 steps grouped in 3 stages. The first stage is descriptive: 1. Investigation requirement analysis, 2. Diagnostic confirmation, 3. Case definition, 4. Identification of cases, 5. Outbreak description (including epidemic curve and risk areas). The second stage is analytic: 6. Develop hypotheses and 7. Test these hypotheses (outbreak origin, diffusion characteristics, spreading risk…). The last stage is formulation: 8. Research questions, 9. Recommendations of surveillance and control measures and 10. Investigation report about the nine previous points.

Investigation methodology with a standard protocol

Boisseleau Didier

The local public services in charge of the population protection can implement or coordinate epidemiological investigation in three circumstances about surveillance and control: investigation on signal reception or declaration; investigation on outbreaks of animal diseases; and finally, investigation upon eradication process in case of infection. Signals come from active surveillance, from firm's own-controls, or from complaint. Alerts result from passive surveillance. The investigation of signals is based on interpretation of laboratory results depending firstly on the positive levels specified by regulation and depending secondly on the number of positive results and their epidemiological context. More investigation on the spot can be made in case of doubt, through additional samples and an epidemiological context more detailed. Confirmed signals are dealt as official alerts. When the infection is confirmed, the investigation on disease outbreaks takes place through epidemiological inquiry, in order

to evaluate the origin of the phenomenon and its ability to spread on, and to set complementary surveillance and prevention measures. Some investigation can occur when animals are slaughtered in order to improve the knowledge of the infection and its consequences. The local public services manage common and usual signals, alerts and disease outbreaks. The regional or national level support or replace them in case of new and unusual matters.

Systematic investigation of cases of bovine tuberculosis: steps and objectives, standardization and revision of the investigation protocol

Scoizec Axelle, Desvaux Stéphanie, Chevalier Fabrice, Jabert Pierre, Courcoul Aurélie & Alvado-Brette Marie-Béatrice

The epidemiological investigation of cases of bovine tuberculosis by departmental veterinary services has become a key and consistent element in the fight against the disease since the publication of the DGAl Service Memo of the 20th of January 2000. The evolutions of the situation in the field along with advances in knowledge and experience have led to a revision of the investigative protocol (DGAl Service Memo; May 27, 2015). A further step will be undertaken to develop a training module for the departmental agents who will be conducting these investigations and use a specific accompanying computer-based tool. Through such steps, we observe that the objectives and content of the investigation protocol evolve in response to advancements in tools, knowledge and the actors involved. The objectives have thus evolved from a simple downstream upstream investigation to an investigation incorporating the determination of risk factors for recontamination. It is also noted that the new protocol provides an increased level of inter departmental harmonization of investigations.

Bovine tuberculosis in a wild boar in a TB-free area in livestock (Loir-et-Cher, 2015): feedback on the epidemiological investigations

Chevalier Fabrice, Hars Jean, Courcoul Aurélie, Hansen Eric, Boschiroli Maria Laura & Richomme Céline

In January 2015 a wild boar was found infected by *Mycobacterium bovis in* the Loir-et-Cher department, a TB-free area since 1986. This created an unprecedented situation since it was the first time in France that an infected wild free-living animal was found outside an area with TB-reported cases in cattle. As requested by the French ministry of agriculture, a multidisciplinary team of scientists from DGAl, ONCFS and Anses, was assembled to investigate the context of emergence of the case, if possible, identify its origin, if possible, and propose surveillance measures in domestic ruminants and in wildlife. The feedback on this investigation highlights the benefits of a multidisciplinary team configuration, and the excellent collaboration and support from the institutions and stakeholders at a national scale (ONCFS, NRL, Cirev) as well as a local one (veterinary services, farmers, veterinarians, hunters). The major difficulty to be dealt with was that most of the hunting grounds in the surveillance area were privately owned. This made it difficult to obtain data on game populations (number, origin, etc.) and to recommend and then implement surveillance measures regarding wildlife.

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Epidemiological investigations in case of chemical contaminations

Gerbier Guillaume

A contaminant may be defined as any substance detected in a place where it is not usually found. That definition covers millions of inorganic molecules. In the field of veterinary epidemiology, those contaminants may arise from the environment (water, soil, air) but also from farming practices (use of drugs for instance). Two starting situations may be distinguished: either the contaminant or the origin of the chemical contamination is known, or clinical signs observed suggest environmental contamination. In this article, we wish to demonstrate the specific features of epidemiological investigations in these situations, in comparison with more conventional investigations dealing with pathogens: knowledge, skills and tools to be used and specific risk management approaches.

Investigation for an outbreak of *Escherichia coli* O104:H4 producing shiga-toxins, in Germany and France, 2011

De Valk Henriette

In May 2011, a large outbreak of haemolytic uremic syndrome (HUS) and bloody diarrhoea caused by an unusual *E. coli* strain occurred in Germany. One month after the detection of the German outbreak, a cluster of HUS and bloody diarrhoea was reported in Southwest France. An investigation of the outbreaks involving all levels of public-health and food-safety authorities was initiated in both countries to identify the causative agent and the vehicle of infection in order to prevent further cases of disease. After close collaboration between the investigation teams in Germany and France and several European agencies, fenugreek sprouts were eventually identified as the vehicle of infection.

Investigation of local transmission of dengue and chikungunya in mainland France

Noël Harold

Chikungunya and dengue are both arboviral infections that cause major outbreaks in the tropics. The risk of local transmission has materialized in mainland France as a result of the spread of the vector mosquito *Aedes albopictus*. Enhanced multidisciplinary surveillance and risk management are the main strategies of the specific preparedness and response plan implemented in mainland France since 2006. Its objective is early detection of imported mosquitoes to prevent the dissemination of chikungunya and dengue viruses and control of local diffusion upon occurrence of autochthonous cases. Since 2010 we recorded the detection and rapid control of two small clusters of autochthonous chikungunya and five small clusters of autochthonous dengue in mainland France. For this plan each emergence is a test as well as an opportunity for improvement in efficacy.

Epidemiological surveillance and investigation, two complementary components for sanitary management

Dominguez Morgane

Epidemiological surveillance and investigation closely interact and complement each other to gather relevant knowledge on a health issue and design effective control strategies. A set of examples was selected to further illustrate those links. An investigation can be launched to assess the characteristics of a health issue detected by a surveillance system. Alternatively, a

surveillance system can be set up, or tailored, in the light of the knowledge brought up by the investigation to widen the description of the situation and follow it up. Lastly, surveillance can be carried out to assess the characteristics of a health issue; its goal is then to investigate. Considering the close links between surveillance and investigation, they should be managed jointly to ensure their synergetic and effective implementation to allow for a rapid risk management.

EPIDEMIOLOGICAL PAPERS

Highly pathogenic avian influenza virus H5N8: particularities and implication for the surveillance in Belgium

Cardoen Sabine, Thiry Etienne, Vangeluwe Didier, Dewulf Jeroen, Gilbert Marius, Saegerman Claude, Lambrecht Bénédicte, Vandecan Michaël, Houdart Philippe & van den Berg Thierry

Given the introduction of highly pathogenic avian influenza virus (HPAI) H5N8 in Europe in 2014, the probability of new introductions, circulation and establishment of the virus in Belgium has been evaluated, and the peculiarities of this H5N8 virus compared to other HPAI viruses, including H5N1, have been highlighted. A warning system based on a routine analysis of the epidemiological situation along the migration routes of wild birds towards Belgium is proposed. This alert system should make it possible to define a level of "risk" of introduction of HPAI viruses in Belgium via wild bird migration at all times in a sustainable manner. A distinction is made between three "risk" levels: basic vigilance, increase alertness and increased risk. In order to be proactive in taking preventive measures to prevent the introduction of HPAI viruses in holdings, specific biosecurity measures were associated with these different "risk" levels. As the H5N8 virus is less pathogenic for wild birds than the H5N1 virus, the probability of circulation and of establishment of the H5N8 virus in the wild fauna in Belgium is believed to be higher. The H5N8 virus is a reassortant sharing many genes with the H5N1 virus and has been circulating enzootically in South-east Asia and some other parts of the world (Egypt, Bangladesh ...) for over 10 years. As long as this situation persists, the "risk" of introduction of HPAI viruses, possibly with modified properties, by wild birds in Europe will remain. Therefore, surveillance in wild birds appears more than ever necessary for the early detection of HPAI viruses.

Evaluation of interactions between wildlife assessed by video surveillance regarding *Mycobacterium bovis* risk transmission

Philipon Sixtine, Payne Ariane, Barbier Elodie & Dufour Barbara

Interactions among wildlife are likely to play a role in the transmission of diseases caused by multi-host pathogens such as *Mycobacterium bovis,* the agent of bovine tuberculosis. Although France is officially free from bovine tuberculosis, some areas are still harbouring infection in cattle and wildlife. We designed a study to assess how often wild species susceptible to bovine tuberculosis visited artificial feeding places and waterholes, which we considered as a priori hotspots for number of individuals and contacts. Then we estimated the number of intra species and interspecies interactions occurring at these places which may lead to transmission of *Mycobacterium bovis*. Finally, we estimated which interactions were most risky for *M. bovis* transmission assessing the likelihood of transmission of *M. bovis* using the

Anses method for risk analysis in animal health. The sites were visited on average 1.41 ± 2.07 times per day. Badger visited baited places more frequently than waterholes whereas red deer visited only waterholes. Feeding, watering and foraging, which may lead to infection and excretion, were the most frequent behaviours. The qualitative risk assessment suggested that wild boars may represent the epidemiological link among species within the wild host community. Management measures at such meeting points should be implemented to limit interactions in order to reduce the circulation of *M. bovis* between animals.

AEEMA Meeting, March 25th, 2016: Oral Communications

The voluntary participation of French farmers to the experimental protocol to assess gamma interferon test: a qualitative study

Boireau Clémence & Praud Anne

In 2013, the Food Directorate of the French Ministry of Agriculture launched a national experiment to evaluate a new screening test - the gamma interferon assay - and its capacity to replace the second intradermal skin test when bovine tuberculosis is suspected. This test was carried out on a voluntary basis. Why did farmers choose to participate or not? To address this question, a sociological survey was conducted in the Ardennes area. It was based on semi-structured interviews of farmers and other stakeholders. Reducing the blocking period during suspicion of tuberculosis is a genuine challenge for the sanitary stakeholders. However, neither farmers nor veterinarians wanted to carry on with the experiment because of its negative impact for them. Moreover, misunderstandings and confusions regarding the objectives of the test led stakeholders to emphatically reject it. When such tests are carried out, communication tools should be cautiously chosen in order to give clear and appropriate explanations about the objectives of the test and its potential consequences. Preference should also be given to the interests of stakeholders. Elements for recommendation are discussed in order to assist managers in reviewing the sanitary experimental set-up.

Re-emergence of Blue-Tongue in France, September, 2015

Sailleau Corinne, Bournez Laure, Bréard Emmanuel, Viarouge Cyril, Cavalerie Lisa, Vitour Damien & Zientara Stéphan

Six years after the introduction of BTV-8 and after two compulsory vaccination campaigns, France was officially declared "free from BT" in December 2012. Almost 3 years later, the disease made his comeback. At the end of August 2015, a ram located in central France (department of Allier) showed clinical signs suggestive of BTV (Bluetongue virus) infection. However, none of the other animals located in the herd showed any signs of the Bluetongue disease. Laboratory analyses identified the virus as BTV serotype 8. Phylogenetic studies showed that the sequences of this strain are closely related to another BTV-8 strain that has circulated in France in 2006-2008. After the detection of BTV-8 virus in this ram, a regional and a national survey were launched in order to evaluate the spread of the infection in France. This paper describes the diagnostic tools used for the detection of this BTV case and the results of the survey carried out.