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Surveillance of wildlife: from theory to practice with the national monitoring program Sylvatub

Julie Rivière, J. Hars, Céline Richomme, A. Fediaevsky, D. Calavas, Eva Faure & P. Hendrikx

Wildlife, as a reservoir or an epidemiological sentinel for some diseases that can affect domestic animals or humans, must be particularly supervised. This can however be problematic because of difficulties in establishing a sampling protocol adapted due to a lack of knowledge about the target population and technical means necessary for implement the protocol. Theses reflections are verified as part of bovine tuberculosis, which can affect many species and that monitoring is especially important for health, economic and political reasons. The current epidemiological context of this disease in France and the potential involvement of wildlife in the epidemiological cycle led to the recent establishment of a national monitoring program in wildlife (Sylvatub) allowing an integrated reflection of the sampling process, diagnostic methods, centralization and data analysis.

A survey of the data collection system for monitoring of wildlife in Italy

Maria Cristina Bona, Serena Robetto, R. Orusa & G. Ru

This study was designed to describe wildlife monitoring activities in Italy and to evaluate the flow of data fed into the OIE information system (IS). The purpose was to revise, simplify, automate and improve the current national information system. A questionnaire survey was carried out involving the local contact points dealing with wildlife diagnostic activity in the *Italian Istituti Zooprofilattici Sperimentali (IIZZSS)*. Data from 20 out of 21 regions were collected in the summer of 2011. Both passive and active surveillance programs are conducted in most regions but planned monitoring in only half of them. Standardized forms for data collection are used in 8 regions only and automated data sharing procedures are available in 14. Large amounts of data are being collected but this activity is regarded as too time-consuming. Moreover, the final data are incomplete as not all data sources may be used. A new IS appears desirable.

Wild birds and *Salmonella* abortions in cattle: a case-control study

P. Gourlay, Marion Ripoche & Anne Lehebel

This is a case-control study designed to elucidate the potential involvement of wild birds in sanitary events in cattle farms. Clinical cases of *Salmonella* abortion in cattle in France were investigated. One hundred and two cattle owners were questioned about wild bird frequentation in their farm. The statistics failed to validate a link between wild birds (mostly European starlings) and the incidence of *Salmonella* abortions. However, the storage in the open air of pelleted feed for cattle appears to be a significant risk factor although no cause/effect relationship could be demonstrated in this study.

Towards a mapping of potential sites for the circulation of avian influenza viruses

Alina Macacu & D. J. Bicout

Avian influenza is a world-wide spread infectious disease that primarily affects birds and can cause extensive damage to the poultry market. In this paper, we construct a model to estimate

the persistence of avian influenza viruses in the environment, as a function of environmental factors. This model is then used to produce risk maps of potential sites for the circulation of avian influenza viruses in the ecosystem of ponds in the *Dombes* region, in France.

Emergence of the Schmallenberg virus in Northern Europe

D. Vitour, Estelle Lara, Corinne Sailleau, E. Breard, C. Viarouge, Alexandra Desprat, Virginie Doceul, Emilie Chauveau, Micheline Adam, Morgane Dominguez & S. Zientara

The sudden and unexpected emergence of BTV serotype 8 (BTV-8) in 2006, in Northern Europe, was regarded as a major event in animal health. With the emergence in 2011of the Schmallenberg virus, another important disease is now spreading in ruminant populations.

Responding to an emerging animal disease: example of the Schmallenberg virus

Morgane Dominguez, J. Languille, A. Fediaevsky, E. Collin, Anne Touratier, S. Zientara, P. Hendrikx & D. Calavas

Schmallenberg virus (SBV) was detected in France during the winter 2011-2012 by the identification of the congenital forms of the disease in ruminants. The French epidemiological surveillance platform for animal health which brings together the administration, the agricultural and veterinary professional organizations and the laboratories has fostered a coordinated response to this emergence. A surveillance of the congenital forms of SBV in ruminants and surveys describing this new disease have been launched promptly. This first experience demonstrates the potential in coordination, adaptability and responsiveness allowed by the platform. The platform should strengthen the cooperation between its members and keep developing new methods to confirm its added value in the French health care system.

The use of capture-recapture methodologies for assessing animal disease surveillance systems: benefits and limitations

T. Vergne, V. Grosbois, B. Durand, F. Roger & Barbara Dufour

Although capture-recapture techniques have long been exploited in public health investigations, their use in surveillance of animal infectious diseases is only recent. Based on a review of the literature, we present various available, techniques and discuss their respective advantages and limitations in investigations on animal health. These techniques are relatively easy to implement and, with little additional input, provide an evaluation of the real significance of a disease in a given territory where proper surveillance processes are lacking. In addition, they can be of help in evaluating factors that affect detection and reporting processes. However, current procedures in animal disease surveillance and control tend to restrict the application of such techniques to individual animals. The evaluation of, surveillance systems should be extended to larger epidemiological units (holdings or communities for example). Such extensions create new constraints (such as higher heterogeneity) that have to be taken into account in order to obtain unbiased estimates.

Using unilist capture-recapture methods to analyse the mandatory notification system of bovine abortion in France during the 2010-2011 reproductive season

Anne Bronner, Emilie Gay, T. Vergne, P. Hendrikx & D. Calavas

Clinical surveillance of bovine brucellosis in France rests on mandatory notification of bovine abortions by farmers and veterinarians. However, under-reporting seems to be a major

limitation of this system. This study was designed to quantify the extent of under-reporting and to assess the factors influencing notification process. To reach the objectives of the study, unilist capture-recapture methods were used since they take into account the incidence of abortions, the incidence of no reporting. MCMC methods and two multi-response models, a zero-inflated Poisson model and a hurdle model, were used to analyse the data. We estimated that 73% (ICr [71% - 75%]) of farmers expected to report abortions failed to do so. This proportion was higher for beef cattle herds than for milk or mixed cattle herds.

Complementary approaches for an evaluation of pooling sera by ten to detect IBR infected herds

L. Mieli, J-P. Alzieu, Chantal Audeval, X. Desclaux, Marie Heurtault & Viviane Moquay

The history of the development of an IBR national control program in France is unique. Numerous questions regarding the advisability of pooling 10 individual sera samples to detect infected herds have been voiced and published (Afssa report 2005 SA 250 for instance). Since the last modifications in procedures dating back to September 2010, we implemented 2 different and complementary approaches to contribute to an operational evaluation of pooling sera by ten (approximately a 15% loss in sensitivity in the detection of infected Herds). A further study on the appropriate degree of sera pooling in order to better detect infected herds is appears highly desirable.

Control of digital dermatitis: assessment of the relative impact of treatment and management practices to limit incidence using survival analysis

Anne Relun, Anne Lehebel, R. Guatteo & Nathalie Bareille

This study was designed to evaluate the respective impact of treatment and management practices on the incidence of digital dermatitis (DD) in cattle under field conditions. An intervention study was conducted in 52 dairy herds endemically affected by DD. The herds were quasi-randomly assigned to one of four treatment regimens, including 2 frequencies and 2 techniques of disinfectant application on the cows' feet. The results were monitored every 4 weeks for a total of 6 months. The impact of treatment regimens and potential risk factors were assessed using a Cox frailty model including time- dependent covariates. A high initial prevalence of DD, a poor leg hygiene and a lack of hoof trimming strongly increased the risk of DD, Collective treatments applied over 2 days every other week tended to limit the incidence of DD These results suggest the need for a multifactorial approach to limit the incidence of DD in dairy herds.

Surveillance of disease emergences in dairy cattle: Developing reproductive disorder indicators

A. Marceau, A. Madouasse, Anne Lehebel, S. Nusinovici & Christine Fourichon

Syndromes' surveillance is based on the routine collection of data which can provide early indicators of health disorders in case of epidemic in human or animal populations. Our work was designed to evaluate the interest for syndromes' surveillance in dairy cattle of artificial insemination dates and calving dates recorded in France. More precisely, four indicators of reproductive disorders based on these dates were evaluated. These four indicators of excess in precocity and amplitude of reproductive disorders were compared during the Bluetongue epidemic in the North of France. Three indicators were found to reveal an excess of reproductive disorders; one of them is synchronized with the first veterinary notifications and

two of them with later notifications, whereas the fourth failed to reveal an excess. Our study shows that the dates of artificial insemination and calving can be used for syndromes' surveillance of diseases affecting reproduction.

Observational surveillance: exposome approach

Delphine Rieutort, R. de Gaudemaris & D. J. Bicout

Observational surveillance, based on the exposome, is a new concept designed to take into account optimally all the information obtained from observational databases. Observational surveillance in the National Network for Vigilance and Prevention of Occupational Diseases (RNV3P) is organized in three steps: the construction of exposome, that of exposure groups and the generation of Matrix Activity-Exposure groups. The concept is illustrated by the example of non-Hodgkin lymphoma (NHL). Several exposure groups consistent with the literature were identified: organic solvents and thinners (including benzene and trichloroethylene), agricultural products and ionizing radiation. This observational surveillance has allowed an additional analysis to improve or strengthen working hypotheses concerning occupational diseases.

The clinician and the epidemiologist: two paradigms, one dialogue

V. Auvigne & Catherine Belloc

Both clinicians and epidemiologists have a role to play in the management of animal diseases, but they sometimes encounter problems in understanding each other. The purpose of this communication is to set a basis for discussion on the causes and consequences of these communication problems. The method chosen was the restoration and discussion of a dialogue between the two groups based on a real case. It appears that the considerable differences in approach of clinicians and epidemiologists are due to generalization vs. individualization on the one hand and to decision making on the other. These differences are a source of misunderstandings, but also a source of enrichment. The two groups may benefit from a combination of their respective visions.

EPIDEMIOLOGY PAPER

Assessment of the sensitivity of four sampling methods and a nested-PCR assay to detect *Mycoplasma hyopneumoniae* in live pigs under field conditions

Christelle Fablet, Corinne Marois, Virginie Dorenlor, F. Eono, E. Eveno, Typhaine Poëzévara, Marylène Kobisch, F. Madec & N. Rose

Four sampling techniques for *Mycoplasma hyopneumoniae* detection, namely nasal swabbing, oral- pharyngeal brushing, tracheobronchial swabbing and tracheobronchial washing, were compared in naturally infected live pigs. 60 finishing pigs were randomly selected from a batch of contemporary pigs on a farm chronically affected by respiratory disorders. Each pig was submitted to nasal swabbing, oral-pharyngeal brushing, tracheobronchial swabbing and tracheobronchial washing. A nested-Polymerase Chain Reaction (PCR) assay was performed on all samples. A Bayesian approach was used to analyse the results of the four sampling methods to estimate the sensitivity of each method coupled to n-PCR, the specificity was taken as equal to one. The most sensitive sampling methods for detecting *M. hyopneumoniae* in live naturally-infected pigs were tracheobronchial swabbing and tracheobronchial washing, as compared to oral-pharyngeal brushing and nasal swabbing.