

2019, ISSUE 76 - Abstracts

Cover

On the first page cover, the professor Edmond Nocard, whose name was given to the building where he worked till year 1903 for the Veterinary School of Alfort. This building was restored recently and enlarged, and the Department for livestock production and public health is now installed here, including the “Unit for controlled disease, zoonosis and epidemiology”, new name of the old “*Service des maladies contagieuses, zoonoses et législation sanitaire*”, where the AEEMA association finds its origin.

AEEMA MEETING, MAY 24th, 2019

Development of scenario trees and use of survey data to assess the probability of rabies virus' introduction in metropolitan France by the domestic carnivores

Crozet Guillaume, Lacaze Cécile, Robardet Emmanuelle *et al.*

Although metropolitan France has been officially declared rabies-free in non-flying mammals since 2001, the rabies risk persists. The main threat comes from domestic carnivores imported or (re)introduced illegally into the country, as illustrated by the last rabies case in 2015. A quantitative risk analysis was considered to estimate the likelihood of rabies introduction into the country, related to importations, introductions and travels of domestic carnivores. For that purpose, it was necessary to build scenario trees that model the various possible pathways of the virus introduction adapted to the current context. In order to set up a realistic model, field data are essential. To meet this objective, two surveys were conducted, respectively among all the Departmental directorates in charge of the veterinary health issues and among some veterinary practitioners in metropolitan France. These investigations allowed to identify the origin of the imported animals and the extent of non-compliances. Although not exhaustive, these data will contribute to scenario trees configuration in order to estimate the annual probability of importing at least one rabies-infected domestic carnivore into France.

International threat linked to animal plagues: biosafety system at the borders of French armed forces

Watier-Grillot Stéphanie, Roqueplo Cédric, Petit Cédric *et al.*

Flows linked to military operations are at risk in relation to the introduction into French national territory or to the international spread of human, animal and plant disease agents. The consequences of importing some of these agents could be catastrophic in terms of health, economics and media. To deal with this problem, the French armed forces have put in place operational health control plans. These plans define the biosecurity measures to be applied, at collective and individual levels, in order to control the health risks associated with military flows.

Multi-block regression on latent classes. Application to antibiotics' use in rabbit farm.

Bougeard Stéphanie, Chauvin Claire, Saporta Gilbert, Niang Ndeye

The statistical processing of analytical epidemiological data aims to determine the risk factors for a disease or veterinary public health problem. To meet this objective, generalized linear

models are used. For observations from different sub-populations, these models exist as latent class models, also known as mixture models. However, in veterinary epidemiology in particular, these methods have three main limitations: 1. The number of observations in a sub-population must be greater than the number of variables, 2. The variables must have a multi-normal distribution, 3. The variables must not have strong multi-collinearity. Each of these hypotheses being rarely satisfied in practice. We propose an extension of the mixture models for a large number of variables that do not satisfy distributional hypothesis. These variables may also have the particularity of being organized into thematic blocks. The proposed method is called multiblock regression on latent classes. It combines the simultaneous search for sub-populations within the observations, as well as local (multiblock) regression models associated with each of these sub-populations. This new method is applied, for example, to the search for risk indicators for antibiotic consumption in French rabbit farms.

Bovine leptospirosis, genotyping and serological diagnosis on bovine aborted fetuses with congenital jaundice.

Delooz Laurent, Czaplicki Guy, Grégoire Fabien *et al.*

Leptospirosis is a global disease of animals, with potential major economic impact on livestock industry and important zoonotic capacities. The disease represents a major challenge in the developing countries as humans and animals frequently live in close association. The serovar Hardjo of *Leptospira* whose primary host is cattle has been studied extensively, but few data exist on other current circulating or emerging serotypes. To better understand the disease in cattle and how to prevent and/or control it, it is necessary to identify the genotype and the serotype of circulating *Leptospira*. This paper presents results of several investigations performed on a historical Belgian collection of congenital jaundice in bovine aborted fetuses coming from the leptospirosis emerging episode of 2014 [Delooz et al., 2015]. The results revealed that *L. Grippotyphosa* and *L. Australis* were the most prevalent serogroups with respectively 17/42 and 13/42 positive MAT during this emerging event associated with the same clinical pattern. The study also confirms that congenital jaundice is associated with *L. kirscheneri* and *L. interrogans* and provides the genotyping of DNA obtained from these two species.

Assessment of the impact of forestry and leisure activities on the risk of propagation of African swine fever: first experts' elicitation

Petit Karine, Dunoyer Charlotte, Fischer Claude *et al.*

In Europe, the African swine fever (ASF) virus represents the most threatening transboundary infectious pathogen of domestic pigs and wild boars, with serious consequences for these populations and the economy. Since its detection in Belgium in September 2018, France has established containment measures, while questioning their impact on wild boar movements and the associated risk of spreading the ASF virus. To address this issue, Anses conducted the first known elicitation of experts on this subject. The relative importance of wild boar disturbance factors and the possible impact of human activities on wild boar movements were estimated using a deterministic approach followed by a stochastic one. The resulting weighted stochastic model was developed to capture the variability of a wide range of territorial conditions and the uncertainty associated with expert elicitation. A regression tree analysis was used to group activities according to the disturbance affecting wild boars. Changes to the wild boar environment and territory intrusion appear as the most disturbing factors to them.

Consequently, related leisure and forestry activities should be of interest: thinning of parcels with machinery, logging (felling of large trees), skidding and mushroom or deer antler picking. The results of this experts' elicitation are particularly important for managers and stakeholders involved in the ASF crisis in Europe.

Economic impact of contagious caprine pleuropneumonia and cost-benefit analysis of the biannual vaccination programs (annexes included at the end of the paper)

Renault Véronique, Hambe Haret A., Van Vlaenderen Guy *et al.*

In Kenya, and West Africa in general, contagious caprine pleuropneumonia (CCPP) is one of the main transboundary diseases of small ruminants. It strongly affects the livelihoods of the livestock keepers in pastoral areas. Biannual vaccination campaigns are organized in order to prevent the disease, but its prevalence remains important. CCPP remains endemic in the area. Measuring the disease impact and the cost-benefit ratio of the control measures such as the vaccination program is a challenging task in pastoral areas, due to a lack of reliable data. Proper data collection is extremely difficult due to the isolation of the areas, the mobility and herds dynamic, as well as the populations' illiteracy. Nevertheless, such analyses are necessary in order to assess the control program effectiveness and to justify the vaccination campaigns' implementation as part of a CCPP eradication program or a livelihoods support program, in order to preserve one of the most important livelihoods of the region. A longitudinal survey was implemented over one year in Turkana County, in order to collect data on the flocks dynamic and record the different causes of mortality. Based on these data, a stochastic model was developed in order to assess the annual economic losses due to CCPP in a standard flock of 100 goats. These losses were compared to the vaccination costs in order to determine the cost-benefit ratio of the vaccination programs. Different effectiveness scenarios were considered in terms of vaccination effectiveness (95%, 50% and 20% effectiveness). The model demonstrates that the cost-benefit ratio remains in favour of the vaccination even with an effectiveness limited to 20% (average ratio of 5.715 with a standard deviation of 3.914). Nevertheless, in order to achieve sustainable results in terms of disease control or livelihoods, a higher effectiveness is required.

Collaborative approach for improving dead equine traceability

Merlin Aurélie, Sala Carole, Schneider Julie *et al.*

Traceability is a crucial component of an effective animal health and food safety system. The core of the French equine traceability system is the central census database (SIRE), managed by the French horse and riding institute (IFCE). The main drawback of this database is the lack of information on the equine status (alive or dead) and date of death, which not allows prevent from knowing the equine living population (size, characteristics). The objective of this study was to identify the ways that could be used to improve dead equine traceability and to assess their level of acceptability and feasibility through a collaborative approach. First, the practices and the perceptions of actors occurring following the equine death (*e.g.* owners, switchboard operators of a rendering company, cremation, insurance companies, *etc.*) were collected through several types of surveys. Secondly, two working groups were set up and allowed the identification of practical levers to improve the rendered and slaughtered equine traceability. They are currently under technical and financial evaluation.

Social network analysis of free-roaming dogs' contact networks in Indonesia and Guatemala

Warembourg Charlotte, Alvarez Danilo, Berger-González Monica *et al.*

The World Health Organization (WHO), the World Organization for Animal Health (OIE) and the Food and Agriculture Organization (FAO) aim to globally eradicate canine-mediated human rabies by 2030. However, the current control programs do not consider the variability of behaviour between individual dogs and between dog populations. Our objective is to study dog contact networks. The structure of these networks might influence the spread of infectious diseases and therefore control programs. This study focuses on owned free-roaming domestic dogs. We collected data in two countries: Guatemala and Indonesia. A total of 341 dogs have been equipped with georeferenced contact sensors. Using network analysis, we highlighted the differences and similitudes between dogs living in the same area (degree, betweenness) and between dog contact networks from different origins (structure, clustering).

Prevention of transboundary animal diseases: application to the French armed forces during the return of deployments outside mainland France

Watier-Grillot Stéphanie, Roqueplo Cédric, Prangé Aurélie *et al.*

French armed forces are often deployed in countries where animal diseases epizootic continue to plague and where state health structures are often disorganized or weakened. Operational health management plans have been developed to prevent the risk of importation of pathogens or disease vectors when returning equipment and personnel to the metropolitan area. The Armed Forces Health Service, through its veterinary expertise, conducts an animal and plant health risk analysis in the country of deployment and establishes technical recommendations. On the basis of this expertise, the force command puts in place, at the point of deployment, collective measures and individual measures, before loading freight and personnel. The application of these measures is subject to command supervision and sanitary control. Feedback is used to learn lessons and to continuously improve ongoing processes.

EPIDEMIOLOGICAL PAPER

Evaluation of the performance of a skin lesions score induced by sarcoptic mange in pigs. Comparative approach to sensitivity and specificity of an Elisa test and scoring methods for dermatitis at slaughterhouse

Delsart Maxime, Dufour Barbara, Arné Pascal *et al.*

Sarcoptic mange is probably the most frequent ectoparasitosis of swine worldwide. The objective of this study was to evaluate the performances of a skin lesion score performed at the slaughterhouse by a comparative approach to sensitivity and specificity of an ELISA test and scoring methods for dermatitis at slaughterhouse. Eighty-four farms in Central and North-eastern France were included, skin lesions of 4 574 pigs were scored from 0 to 3 at the slaughterhouse, according to severity of scabies-induced dermatitis. For each farm, 10 blood samples were collected and analysed using the Sarcoptes-ELISA 2001®Pig test. Out of 837 samples, only 8 were seropositive, distributed among 6 farms. 9.5% of the animals had extensive skin lesions (score 2 or 3). No association between individual scoring and serological status of the farm was identified. Whether the status of the herd was defined by the average

dermatitis score or the rate of animals with extensive lesions, the sensitivity and specificity of sarcoptic mange diagnosis by this type of scoring method was insufficient (between 0.5 and 0.77, with very important credibility intervals) according to the results of a Bayesian statistical approach of the comparative performances of the visual score and the ELISA, without a gold standard.