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Starting an epidemiological survey on BVDV infection in Burgundy.

E. Petit

The concerted analysis of the epidemiologic situation of the BVD under the conditions of breeding in Burgundy, with a large part of Charolais cattle, led the actors of the animal health of this area to propose to the stockbreeders a fight based on the control of the clinical expression of the disease by vaccination, especially in the breeding exposed to contaminations and a reinforcement of biosecurity measures in the isolated breeding. In order to estimate and follow the epidemiologic and economic importance of the BVD and to evaluate the effects of this strategy, a regional observatory was founded in 2004. A serologic investigation into the young females evaluated the importance of the viral circulation which touched nearly 14% of the young bovines. The observations show a geographical heterogeneity and must be confirmed by further observations.

Molecular and descriptive epidemiology of Bluetongue in Corsica on 2004

Corinne Sailleau, E. Bréard, G. Gerbier, J. Parodi, A. Bouchot & S. Zientara

Bluetongue, a non-contagious arboviral disease (absent in Europe until 1979), has re-emerged in the Greek islands in 1998. Since then, five virus serotypes (1, 2, 4, 9 and 16) were isolated in Greece, Bulgaria, Kosovo, Macedonia, Italy, Spain, Portugal, Corsica, Tunisia and Morocco. The serotype 2 virus was the cause of the 2000 and 2001 outbreaks in Corsica. During autumn 2003, outbreaks of Bluetongue serotype 4 were reported in Corsica. In this paper, we describe the serotypes 4 and 16 outbreaks which have been reported in Corsica in 2004. The serological surveillance has allowed to show that the virus has circulated during the first six months 2004, the clinical signs only appeared in August. The characteristics of the segments 2 and 10 of the isolated strains and the surveillance measures which have been performed are described.

Antibody detection by ELISA in chicken infested with *Dermanyssus gallinae*

S. Arkle, J. Guy & O. Sparagano

The poultry red mite (*Dermanyssus gallinae*) is currently one of the most detrimental ectoparasites in laying birds across several countries. Symptoms of *D. gallinae* infestation include reduction in production, poor egg quality, increased of the mortality and also a compromise to welfare. Feeding on its host for only short periods of time, the red mite spends the vast proportion of its short life-cycle hidden deep within the house substructure. For this reason, prevalence of red mite is greater in free range or barn systems as opposed to cage systems, since a greater number of potential hiding places can be sought. The problem will therefore be amplified with the impending EU ban on battery cage production in 2012. This, in conjunction with concern over resistance to acaricides, toxicity risks and acaricide withdrawal, make control particularly problematic and financially draining for producers. Therefore, alternative methods must be sought, such as vaccine development. However, in order for this to be achieved, an understanding of mite antigenicity must first be established. Thus, the purpose of this study was to assess immunological response of humoral

antibodies to naturally occurring mite antigens, using enzyme-linked immunosorbent assay (ELISA) and SDS-PAGE. Antibodies were derived from egg yolk and blood sera which were collected from commercial laying farms across the UK with varying levels of red mite infestation and using different production systems (caged, barn and free range). In addition, mites were trapped and counted periodically so as to follow population dynamics over a flock lifespan in conjunction with a series of production measures (eggs produced per bird per week, mortality and temperature). The results describe the effect of red mite infestation on production parameters, immunological response and the relationship between them.

Analysis of sanitary data with fuzzy regression tree

Marie Lahaye, Claire Chauvin, Coralie Lupo & P-Y. Glorennec

Identification of risk factors and decision rules usually involves multivariate data analysis methods, such as segmentation, linear or logistic regression. Another method is proposed here to build easily interpretable regression trees from data collected on-farm. The fuzzy regression trees combine a facility of interpretation and the absence of threshold of fuzzy logic. An illustration of an application of this method is given with the analysis of risk factors for turkey carcasses condemnation.

Study of the influence of the dependence of the tests on the predictive values of a combination of two tests. Application to the example of the I.B.R.

E. Petit & R. Pouillot

For the screening of infectious diseases, a second test is often used to confirm or refute an initial positive test. However, the aptitude to establish a correct biological diagnosis depends on the well-known sensitivity and specificity values, but also on the dependence between the tests. This essential concept is generally ignored. In this context, the influence of the dependence of two tests used is studied, theoretically and on a numerical example from IBR ELISA tests used for screening. The more dependent two tests are, the more they will tend to give the same result. The dependence may be split into: 1. a dependence on sensitivities: if this dependence is high, the second test will tend to confirm the first test on an infected animal. However, this dependence on sensitivity is also reflected in the proportion of infected cattle not detected by both reagents; 2. a dependence on specificities: if the dependence is high, the second test will tend to confirm a first false positive test on a disease-free animal. This dependence in specificity is reflected by the proportion of disease-free cattle classified erroneously positive by the two tests. The knowledge of these factors of dependence, expressed here in an original way, allows calculating the predictive values of each combination of the two tests. The numerical application on the example of the IBR reveals the strong influence of the dependence of specificities on the risk to falsely classify infected a healthy animal, in situation of very weak prevalence (situation of the qualified herds). In the studied example, in a 0,1% prevalence situation, the probability that a two tests positive animal is really infected decreases from 90% in the case of independence of the tests to less than 20% (factors of dependence estimated from a population of 5 221 bovines analysed jointly with the two tests). This analysis is in accordance with field observations, where managers of the IBR screening are sometimes confounded, as formerly those of Brucellosis. The significance of the dependences of the tests and their quantitative appreciation are also discussed.

Interest of serology in characterization of *salmonella* status in pig units

Sylvie Dubroca, Isabelle Corrège, Morgane Goueset, F. Guyomard, Delphine Loiseau, Y. Salaun, B. Minvielle & A. Le Roux

Salmonella are the main cause of human collective food-borne outbreak. A new European regulation published in November 2003 imposes to set up a control of these bacteria in the swine industry. Detection of asymptomatic pigs carrying *Salmonella* and a specific slaughtering process should reduce contamination of pork products. The interest of a serological method to evaluate levels of *Salmonella* in swine herds was investigated in 2,000 pigs. 5 batches of 20 pigs stemming from 20 finishing pig herds were tested. Caecal contents were analysed with a bacteriological method and meat juice samples with a serological test. The concordance between these two methods was low at the individual level and moderate at the batch level. The instability of the serological and bacteriological status of the herds was also established. An effect of waiting time at slaughterhouse on bacteriological results was observed. Finally, this survey highlighted a clear influence of dry feeding on bacteriological and serological results.

Factors associated with *Lawsonia intracellularis* infection of growing pigs. Analytical survey in French farrow-to-finish pig farms

Christelle Fablet, Claire Chauvin, J-P. Jolly, E. Eveno, Sylvie Chouët, L. Miéli, F. Madec & P-A. Beloeil

A study was carried out in 95 French farrow-to-finish pig farms in 2000-2001 in order to identify the circumstances associated with *Lawsonia intracellularis* infection. In each farm, a batch of growing pigs was considered. The *Lawsonia intracellularis* status of the followed batches was determined using an indirect immuno-fluorescent assay test. For this purpose, in each batch, 15 sera were obtained at 16 weeks of age. The batches were categorised in 3 classes: non-infected (0 or 1 serum positive), moderately infected (2 to 7 sera positive) and highly infected (more than 7 sera positive). Information about biosecurity measures, general hygiene on the farm, the rearing characteristics and sanitary events of the followed batches were recorded by means of questionnaires. Two cumulative logistic regression models were used to assess the association between this information and the *Lawsonia intracellularis* infection status. The first model was performed to explain the risk of being in a non-infected vs. an infected category. The second one aimed at identifying factors associated with the odds of being in a non, or moderately, infected class vs. a highly infected category. Biosecurity rules in place on the farms especially those regarding the personnel, stocking density in post-weaning section, the implementation of a dietary transition between the post-weaning and fattening phases and the duration of the down periods (after cleaning and disinfection) in between two subsequent batches were factors retained in the first model. In the second model stocking density in the post-weaning compartment, the age of the piglets when they left the post-weaning area, moving the entire or a part of the batch into another room during the post-weaning phase have been identified as significant risk factors. An antibiotic treatment towards digestive disorders at the beginning of the fattening period remained as a protective factor in the final model.

Implementation of a monitoring system of antimicrobial use in poultry production

Claire Chauvin, Sophie Le Bouquin, Angela Hardy, Delphine Haguët, J-P. Orand & P. Sanders
Using existing on-farm records, as part from the regulation on meat inspection, a sampling scheme was implemented to collect on a simple, representative and continuous basis, the forms providing history of antimicrobial consumption of poultry flocks slaughtered in Brittany. Relational databases conceived, study realized to check the validity of farmers declarations and examples of data and results obtained during the first 18 functioning months are presented.

The Epidemio-Surveillance Systems in 13 PACE countries of West Africa: Situation and assessment of their operation in 2004

Cécile Squarzoni, F. Bendali, N. Denormandie, P. Bastiaesen & B. Diop
The PACE programme aims at contributing to poverty alleviation and the development of the livestock sector in Africa. In order to achieve these goals, the implementation and the operation of surveillance systems for animal diseases or Epidemio-surveillance systems (ESS) in each country constituted one of the main tools. An evaluation of these surveillance systems was developed, in order to identify, with regular interval, the main strengths and weaknesses of their operation and their evolution in time. The analysis consists of a semi-quantitative evaluation in 2004, based on the knowledge accumulated on the national ESS's of 13 PACE ESS's in West Africa. Overall, 67 criteria enabled the authors to appreciate the set-up of these ESS's. Average scores per country and topic were calculated (average/4) and histograms established against set of topics and countries. The country scores enabled the authors to distinguish a leader-group, where the activities are considered to be relatively satisfactory (total score of above 2,25), for Mauritania, Senegal, Guinea, Ghana, Benin, and a group of four countries where implementation is deemed insufficient, with scores lower than 2/4 (Togo, Gambia, Guinea-Bissau, Côte d'Ivoire). The cross-section analysis of the various topics covered 11 main sets of topics. Two major areas of activities present scores higher than 2.5/4; namely "Functionality and implementation of the surveillance system" and "Capacities of the diagnostic laboratories". Three sets of topics present scores lower than 2: "National sanitary policies", "Surveillance of wildlife" and "Performance indicators". This last heading is currently the one least taken into account in the PACE countries. In conclusion, this method enabled PACE management to appreciate in an economic and rapid way, the state of the activities of surveillance, but especially to identify the priority actions to carry out in order to improve the level of effectiveness of this ESS.

First mycobacterial isolates from livestock of Chad and molecular epidemiology

E. Schelling, Colette Diguimbaye, M. Hilty, Franca Baggi, R. Ngandolo & J. Zinsstag
The first laboratory to culture *Mycobacteria* was established in Chad to confirm the presence of bovine tuberculosis and to describe the distribution of *M. tuberculosis* complex strains in livestock and humans. Specimens were collected on condemned animal carcasses due to tuberculosis. Spoligotyping and analysis of Variable Numbers Tandem Repeats (VNTRs) have been used on 67 *M. bovis* strains. The prevalence of tuberculosis-like lesions at the slaughterhouse was 7.3%. More M'bororo than Arab zebus were condemned ($p = 0.04$), M'bororo carcasses were more often entirely condemned in comparison to a partial

condemnation ($p < 0.001$) and *M. bovis* was more often isolated from M'bororo carcasses than from Arab zebu ($p = 0.004$). Spoligotyping showed same characteristics between Chadian and North Cameroonian strains. Spoligotyping classified >90% of strains in clusters and analysis of 12 MIRU-VNTR loci 84%. Three other VNTR loci (ETRA, B, and C) showed a higher discriminatory power than MIRU loci that are more discriminative for *M. tuberculosis* than *M. bovis* strains. The appropriate method for the distinction between *M. bovis* strains needs first to be identified. In Chad, epidemiologic and economic studies on bovine tuberculosis in humans and livestock will contribute to define an adapted control program for zoonotic disease.

Diagnostic survey on contagious epididymitis of rams in Piedmont (Italy)

Maria Silvia Gennero, Carla Grattarola, Simona Zoppi, Maria Gloria, Stefania Bergagna, Elisabetta Di Giannatale & A. Dondo

Brucella ovis is the causative agent of contagious epididymitis of rams. It produces a clinical or subclinical disease in sheep that is characterised by genital lesions in rams and the main consequence is reduced fertility. We have tested 634 animals by serological test (CFT). Two positive rams were slaughtered and their samples were further processed with other laboratories researches: bacteriological examination and PCR. Twenty eight' animals among 634 were resulted seropositive, both males and females. Bacteriological testing has elicited the presence of *Corynebacterium spp* in both rams and the presence of *Brucella spp* in one of two rams.

Survey on ovine and bovine toxoplasmosis in Haute-Vienne

L. Rozette, A. Dumètre, C-Y. Couquet & Marie-Laure Dardé

A survey has been done on ovine and bovine toxoplasmosis in Haute-Vienne (France). On the sample, the percentage of positive results has been 21 for lambs, 59 for ewes and 27 bovines.

EPIDEMIOLOGY PAPERS

Bluetongue in La Reunion

Corinne Sailleau, E. Bréard, J-M. Gourreau, T. Galibert & S. Zientara

This paper describes outbreaks of bluetongue (BT) in July 2003 in the French *La Reunion* Island. The molecular tools (which have been developed in our laboratory since the emergence of this infection in Europe in 1998) have been used. The virus has been quickly identified by specific group RT-PCR and typed by specific type RT-PCR. The nucleotide sequences of the amplified products have been determined. The infectious BT virus (serotype 3) has been isolated on embryonated chicken eggs and cell cultures a few weeks later. The serotype has been confirmed by virus neutralization test (using the 24 antisera). Moreover, serological and epidemiological data seem to indicate that other BT serotypes circulate on the Island.

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Highly pathogenic avian influenza in South-East Asia: Situation of the epidemics on March 31st, 2005

Morgane Dominguez & Barbara Dufour

The aim of this article is, after having briefly presented the main characteristics of the avian influenza epidemic caused by the highly pathogenic H5N1 influenzavirus which prevails in south Asia, since the winter 2003, to register the animals and humans' infections spots in all the countries concerned, according to the data available on March the 31st, 2005.

Analysis of the control methods of highly pathogenic avian influenza

Morgane Dominguez & Barbara Dufour

The aim of this article is, after having briefly presented the main advantages and disadvantages of various control strategies against avian influenza viruses: (i) to analyse the few lessons drawn from the more important epidemics appeared in the world since the last few years; (ii) to study the factors of success and failure of the methods of control implemented by the countries of South Asia to fight against avian influenza epidemics which began in 2003.

HISTORY

The Interdepartmental Commission of Rabies control

B. Toma

This text presents the history of the Interdepartmental Commission of Rabies control which worked from 1972 to 2005. Created four years after the appearance of fox rabies in France, this Commission knew two main periods corresponding to different missions: the first one (1972-1976) related to the development of a national plan of fox rabies control; the second (1978-2005) based on the circulation of information between ministries implied in the fox rabies control. In fact, the carried-out actions strictly did not respect the objective. In particular, during the second period, the Commission has been at the origin of the necessary impulse to get a decision at the highest level for the attribution of money allowing employment on a large scale of the fox anti-rabies vaccination by oral way, vaccination which strongly contributed to the eradication of fox rabies in France.