Effect of heat stress on faecal microbiota composition in swine: preliminary results

Mathilde Le Sciellour, Isabelle Hochu, Olivier Zemb, Juliette Riquet, Hélène Gilbert, Mario Giorgi, Yvon Billon, Jean-Luc Gourdine, David Renaudeau

Effect of heat stress on faecal microbiota composition in swine: preliminary results

M. Le Sciellour[1], I. Hochu[2], O. Zemb[2], J. Riquet[2], H. Gilbert[2], M. Giorgi[3], Y. Billon[4], J.-L. Gourdine[5] and D. Renaudeau[1]

[1]PEGASE, INRA, Agrocampus-Ouest, 35042 RENNES, France, [2]GenPhySE, Université de Toulouse, INRA, INPT, INP-ENVT, 31320 Castanet Tolosan, France, [3]PTEA, INRA, 97170 Petit-Bourg, France, [4]GenESI, INRA, 17700 Surgères, France, [5]URZ, INRA, 97170 Petit-Bourg, France; mathilde.lesciellour@inra.fr

Gut microbiota plays a central role in health and nutrient digestion and would help the host for better coping with environmental perturbations. In tropical conditions or in temperate countries during Summer, elevated ambient temperatures can cause economic losses to the pig industry. During heat stress (HS), the reduction in voluntary feed intake is the main adaptation response for reducing heat production. This lower feed intake has subsequent negative effects on pig performance. The main purpose of this study was to investigate the relationships between HS and gut microbiota composition. A better understanding of the microbiota response to HS could allow the selection for animals well adapted to HS. Genetically related pigs were raised under temperate or tropical farm conditions with mean thermal humidity indexes respectively 23 and 25.5 from 11 to 23 weeks of age. In temperate conditions, pigs were submitted to a 3-week HS challenge at 30 °C. Faecal samples were collected in all pigs at 23 weeks of age in both environments (n=1,200 samples) and at 26 weeks of age in the temperate environment (n=600). Therefore, it was possible to compare microbiota from pigs raised in a temperate environment, a tropical climate, and exposed to HS. Microbiota extracted from pigs under temperate and tropical climate had different compositions whereas pigs exposed to heat challenge or raised in tropical conditions tended to share a common microbiota. HS challenge drastically modified gut microbiota and the groups before and after the challenge could be predicted in a multilevel sparse partial least square discriminant analysis with 30 OTUs and a mean classification error rate of 14%. Our experiment suggests that microbiota can be used as biomarkers of HS exposition. This study is part of the Feed-a-Gene Project funded by the European Union's H2020 Program (grant 633531), and of the PigHeat project funded by the French National Agency of Research (ANR-12-ADAP-0015).

The socio-economic evaluation of vaccines in livestock systems

C. Bellet and J. Rushton

Institute of Infection and Global Health / University of Liverpool, IC2 Building, 146 Brownlow Hill, L3 5RF, Liverpool, United Kingdom; camille.bellet@liverpool.ac.uk

Socio-economic evaluations provide a foundation to define resource allocation priorities and disease management strategies, which in turn help to tailor interventions to the specific context of a livestock system. This presentation examines how socio-economic evaluations of vaccines are performed in animal health research in relation to three European cases of respiratory and digestive diseases in cattle, pig and poultry. It explores their limitations and the potential of transdisciplinary approaches to support more robust evaluations of livestock vaccination interventions. Vaccines not only help to protect against acute diseases but also against chronic diseases that may not hit the headlines, but which are important for livestock businesses and society. Vaccines also benefit unvaccinated animals, their owners and consumers by decreasing disease transmission, which in turn reduces the risk of epizootics and the pressure generated by these epizootics on health care providers and market economy. In addition, vaccines impact on drug use reducing selection pressure for drug resistance, and improving drug efficacy in humans. However, for vaccines to generate these benefits, the associated vaccination strategies need to protect critical proportions of animals on a given time scale. These strategies depend on vaccine quality, availability, accessibility and acceptability to farmers, their animal health advisors, and increasingly consumers. The growing complexity of vaccines, vaccine delivery and their relationship to long and diverse food systems demand interdisciplinary and integrative approaches that address human, animal and ecosystem dimensions. Yet current socio-economic evaluations of livestock vaccines remain mostly limited to one of the many dimensions of a disease problem such as the reduction of disease incidence. The presentation concludes that there is a need to unpack the dynamics of farm practices and the food system to understand how these shape animal health management and vaccine intervention. This requires a transdisciplinary approach with a depth of different forms of expertise and data sources in order to achieve informed evaluations on the trade-offs of vaccine intervention.