In this CVERA e-zine, we provide a brief overview of some of the recent work conducted by CVERA staff in collaboration with a wide range of national and international institutions. More in-depth information can be found at http://www.ucd.ie/cvera/, noting the role of CVERA to provide high quality independent scientific research and advice to support national evidence-based policy-making in animal health & welfare and public health and related matters.

Ongoing projects

A wide range of projects are ongoing in CVERA at any one time. Some projects are led or co-ordinated by CVERA members while others, led by members of other departments or organisations, require specific support or analysis. Some of the projects that CVERA members are currently leading include i) the development of a quantitative risk assessment methodology for cheese made from unpasteurised milk from cows subsequently identified as being infected with *Mycobacterium bovis*, ii) the quantification of local bovine tuberculosis (bTB) transmission in badgers and cattle with and without vaccination of badgers (*Meles meles*) in Ireland, iii) the spatial structure of farms in Ireland, iv) spatio-temporal models of bovine tuberculosis in the Irish cattle population, 2012-2019, iv) an analysis of the role of cattle movements in the transmission of bovine tuberculosis, and v) risk factors for recent Bovine Viral Diarrhoea (BVD) outbreaks on farms with long-term history of freedom. The studies mentioned above are a small example of the projects to which CVERA members are currently contributing to. Several of these projects are nearing completion and all will help to inform policy in the future.

Combining expert knowledge and machine-learning to classify herd types in livestock systems

A paper by Jonas Brock and Colleagues from the Department of Ecological Modelling at the Helmholtz Centre for Environmental Research GmbH-UFZ in Germany, Animal Health Ireland and UCD CVERA recently published a paper on "Combining expert knowledge and machine-learning to classify herd types in livestock systems" in *Scientific Reports*. The study presents a new approach to classify herd types in livestock systems by combining expert knowledge and a machine-learning algorithm called self-organising-maps (SOMs). The authors provide a data-driven classification tree using decisions derived from the Irish livestock registration data. In total, 17 different herd types were identified in Ireland, including four different dairy herd types: typical dairy herds (male calves sold within a few weeks of birth, most female calves reared as replacements), dairy farms that rear both female and male calves, dairy herds that use contract rearing for their heifer calves, and dairy farms that rely on purchase of replacement heifers and cows. This approach will be applicable across a broad range of epidemiological studies in Ireland, providing a method to accurately

classify herds with a high level of resolution. To the authors' knowledge, this is the first time that the SOM algorithm has been used to differentiate livestock systems. The paper is available at *Scientific Reports* 11, 2989.

Development and application of a prioritisation tool for animal health surveillance activities in Ireland

Anne Marie Clarke from the One Health One Welfare Scientific Support Unit in the Department of Agriculture, Food and the Marine has published a paper on the "Development and application of a prioritisation tool for animal health surveillance activities in Ireland" in *Frontiers in Veterinary Science*. Decisions around animal health management by stakeholders are often subject to resource limitation, and prioritisation is needed to evaluate whether effort is attributed appropriately. In this paper, the authors describe the development and implementation of such a prioritization tool. In this study, antimicrobial resistance and bovine tuberculosis were ranked top of the endemic diseases/conditions in the Irish context, while African swine fever and foot and mouth disease were ranked top of the exotic diseases/conditions by the stakeholders. The paper is available at *Frontiers in Veterinary Science* 7, 596867.

Modelling transmission and control of *Mycobacterium avium* subspecies *paratuberculosis* within Irish dairy herds with compact spring calving

Modelling studies are increasingly used in support of national animal disease control/eradication programmes, to evaluate the impact of different policy options on programme progress into the future. Floor Biemans with colleagues from INRAE in France, Teagasc and UCD CVERA in Ireland have published a paper on "Modelling transmission and control of *Mycobacterium avium* subspecies *paratuberculosis* within Irish dairy herds with compact spring calving" in *Preventive Veterinary Medicine*. In this work, Floor has adapted an existing French model to Irish conditions, to better understand *Map* transmission in Irish dairy herds. The current paper describes this adaptation process, specifically relating to within-herd events. The paper is available at *Preventive Veterinary Medicine* 186, 105228.

Stakeholder perceptions of non-regulatory bovine health issues in Ireland: past and future perspectives

A paper by Natascha Meunier and colleagues from Animal Health Ireland, UCD CVERA and the Department of Management, School of Business & Humanities, TU Dublin recently published a paper on "Stakeholder perceptions of non-regulatory bovine health issues in Ireland: past and future perspectives" in the *Irish Veterinary Journal*. There have been multiple (political, environmental, cultural) drivers of change in Irish agriculture in recent years, including the establishment of Animal Health Ireland (AHI) in 2009. In this study, the authors describe the opinion of stakeholders (farmers, veterinary practitioners and agricultural industry professional service providers) on their perceptions of changes in selected non-regulatory bovine health issues over the last 10 years and priority issues relevant to non-regulatory bovine health to be tackled over the next 10 years. Three priorities relevant to non-regulatory bovine animal health over the next 10 years were identified, including antimicrobial resistance (highlighting measures to reduce both on-farm usage and resistance), anthelmintic resistance, greenhouse emissions and calf welfare, which aligns closely with broader societal concerns. This information is useful to AHI, particularly with respect to future priorities. The paper is available at *Irish Veterinary Journal* 73, 25.

Recent presentations

During January 2021, Simon More presented on three diverse topics relevant to CVERA, including:

- 'Veterinary contributions to the national COVID-19 response', at the annual CAVI conference
- 'Bridging the gap between epidemiology and quantitative genetics: bovine tuberculosis as a case study' at an international conference in honour of Professor John Woolliams, who has retired from the Roslin Institute, Scotland
- 'Towards an integrated and holistic risk assessment of multiple stressors in honey bees', to the Environment, Public Health and Food Committee of the European Parliament

The latter presentation coincided with the launch of the draft scientific opinion on a systems-based approach to the environmental risk assessment of multiple stressors in honey bees by the Scientific Committee of the European Food Safety Authority. Further detail is available at here.

The Seventh International Conference on *Mycobacterium bovis* (*M. bovis* 2022)

After postponing the original conference last March, the *M. bovis* Committee reconvened recently to discuss options. The Committee agreed that it is not feasible to hold the conference in 2021, as many people are reluctant to, or restricted from, international travel. We also decided against holding a virtual event as we believe that one of the major strengths of the *M. bovis* conference is that it allows our small international community of researchers, decision makers and industry members to meet, network and socialise together in person. Taking these issues into account and subject to future pandemic guidelines, we have decided to host the *M. bovis* conference in June 2022 in Galway, Ireland. Please visit https://www.mbovis2022.com/ or follow the conference @mbovis2022 for more information.

Recent news items, can be found at:
http://www.ucd.ie/cvera/news/

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