

Centre for Veterinary Epidemiology and Risk Analysis (CVERA)



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.

Biennial Report 2020-2021

The Biennial Report 2020-21 outlines research conducted by, or in association with members of the Centre for Veterinary Epidemiology and Risk Analysis and the TB Diagnostics and Immunology Research Laboratory during 2020 & 2021. It also provides updates on ongoing projects. Areas of research include bovine tuberculosis, infectious diseases of cattle, other animal health and welfare issues, and COVID-19. This work is only possible in collaboration with colleagues from over 70 national and international organisations. The Biennial Report 2020/21, and previous versions of this report, are available at <https://www.ucd.ie/cvera/reports/>

Risk factors for detection of bovine viral diarrhoea virus in low-risk herds during the latter stages of Ireland's eradication programme

A national programme to eradicate bovine viral diarrhoea (BVD) has been in place in Ireland since 2013. An understanding of risks of infection in a low prevalence system is required to inform decision making in the end stages of eradication. This information would also support the development of post-eradication

surveillance strategies. This paper describes the results of a case-control study in which cases were herds with one or more test positive calves for the first time in 2019 (n = 204). A range of risk factors were considered, and a generalised linear mixed model, including a county-level random effect, was developed. Our findings suggest that care with biosecurity at farm boundaries and visitors and equipment entering the farm, and avoidance or careful risk assessment of purchasing potentially pregnant animals, may help prevent introduction of BVDV to low-risk herds. At policy level, consideration of herd size, proximity to test positive herds and purchasing patterns of potentially pregnant cattle may help target surveillance measures towards the end of the eradication programme. [[Casey-Bryars, M. et al - *Preventive Veterinary Medicine* 201, 105607](#)]

Mastitis control and intramammary antimicrobial stewardship in Ireland: challenges and opportunities

The Veterinary Medicines Regulation (EU 2019/6) came into force in all EU member states on 28 January 2022, placing particular emphasis on prudent and responsible antimicrobial use in food animal production. The

Regulation presents challenges to the Irish dairy industry, particularly with respect to current approaches to dry cow therapy. In response, the CellCheck technical working group (TWG, a technical group working in support of CellCheck, the national mastitis control programme) have developed pragmatic national and farm-level recommendations in support of improved mastitis control and intramammary antimicrobial stewardship in the Irish dairy industry. Periodic programme review will be needed, informed by ongoing monitoring of key performance indicators, to identify those actions that are most effective in an Irish context.

[\[More, S.J. et al - *Frontiers in Veterinary Science* 9, 748353\]](#)

Intramammary antimicrobial sales in Ireland: a descriptive 2020 update

Intramammary (IM) antimicrobial sales data are currently the only feasible means to gain broad insights into on-farm usage of antimicrobials (AMs) relevant to mastitis control within the Irish dairy industry. Updating earlier work, this study describes sales data of intramammary antimicrobial usage in the Irish dairy industry in 2020. We observed a large increase in the use of dry cow (DC) IM AMs, from 0.95 to 1.13 defined course dose (DCDvet) per cow per year in 2019 and 2020 respectively, as well as evidence of ongoing usage of highest priority critically important AMs (HP CIAs). There was also a slight increase in lactation use of IM AMs, from 0.43 to 0.44 defined course dose (DCDvet) per cow per year. The sales pattern described here, most importantly the increased use of dry cow products and ongoing and increasing use of HP CIA products in both DC and lactation therapy raise concerns for the Irish dairy industry. This study was led by Catherine McAloon from the UCD School of Veterinary Medicine.

[\[McAloon, C.I. et al - *Irish Veterinary Journal* 75, 5\]](#)

The Irish cattle population structured by enterprise type: overview, trade & trends

The cattle sector is the most important economic production unit of the Irish farming and agri-food sector. This paper presents an overview of the Irish cattle population structured by enterprise type. We collected data from the cattle register for the period 2015 to 2019 and assigned registered herds to one of 18 different herd types using a recently published herd type classification approach. It is now possible to explore temporal changes in enterprise (sub)types, and describe movements between these subtypes and from these subtypes to slaughter. This information will contribute to a number of future comparative studies, including cross-sectoral assessments of profitability, estimation of the extent of animal health losses on Irish cattle farms or structural analysis of Greenhouse Gas (GHG) emissions across production systems. This project was led by Jonas Brock from the Helmholtz Centre for Environmental Research GmbH - UFZ in Leipzig and Animal Health Ireland.

[\[Brock, J. et al - *Irish Veterinary Journal* 75, 6\]](#)

Output-based assessment of herd-level freedom from infection in endemic situations: Application of a Bayesian Hidden Markov model

In the context of control programmes (CP) for cattle diseases, practical methods are needed to assess the confidence of freedom from infection that is achieved. As part of the STOC free project, a Bayesian Hidden Markov model was developed, called STOC free model, to estimate the probability of infection at herd-level. Using field data from control programmes for bovine viral diarrhoea virus (BVDV) in four study regions, this study sought to estimate the probability of herd-level freedom from BVDV in regions that are not (yet) free. The STOC free model calculates a posterior value for the model parameters (e.g. herd-level test sensitivity and specificity, probability of introduction of infection) and

a predicted probability of infection. In all study regions, the predicted probabilities of freedom were very high, ranging from 0.98 to 1.00. Compared with scenario tree modelling, the STOC free model uses actual CP data and estimates are easily updated when new data becomes available. This project was led by Annika van Roon from Utrecht University. [[van Roon, A.M. et al - *Preventive Veterinary Medicine* 204, 105662](#)]

Development of a syndromic surveillance system for Irish dairy cattle using milk recording data

Emerging vector-borne diseases have become a substantial threat to cattle across Europe. Early detection is important, but difficult when clinical signs are non-specific. Furthermore, there is often a delay in the development of new diagnostic tests for novel pathogens which limits the ability to detect emerging disease in the initial stages. Syndromic Surveillance could potentially augment traditional methods by detecting aberrations in non-specific disease indicators. The aim of this study was to develop a syndromic surveillance system for Irish dairy herds based on routinely collected milk recording and meteorological data. We sought to determine whether the system would have detected the 2012 Schmallenberg virus (SBV) incursion into Ireland earlier than conventional surveillance methods. Using a range of thresholds, our model generated alarms throughout September 2012, between 4 and 6 weeks prior to the first laboratory confirmation of SBV in Ireland. This system for monitoring milk yield represents both a potentially useful tool for early detection of disease, and a valuable foundation for developing similar tools using other metrics. This project was led by Alexander Douglass from the UCD School of Veterinary Medicine. [[Douglass, A.P. et al - *Preventive Veterinary Medicine* \(in press\)](#)]

Simulating partial vaccine protection: BCG in badgers

In wildlife disease management, there are few diseases for which vaccination is a viable option. The human vaccine BCG has been used for the control of bovine tuberculosis in badgers since 2010 and is expected to increase. Understanding the long-term effects of repeated vaccination campaigns on disease prevalence is vital, but modelling thus far has generally assumed that a vaccine provides perfect protection to a proportion of the population, and that animals exposed to a repeated vaccination have a second independent chance of becoming protected. We held a workshop with experts in the field to obtain consensus over the main pathways for partial protection in the badger, and then simulated these using an established model. The available data supported the possibility that some individuals receive no benefit from the BCG vaccine, others may result in a delayed disease progression and in the remaining animals, vaccine protected the individual from any onward transmission. Simulating these pathways using different levels of overall efficacy demonstrated that partial protection leads to a reduced effect of vaccination, but in all of the identified scenarios it was still possible to eradicate disease in an isolated population with no disease introduction. This project was led by Graham Smith from APHA. [[Smith, G.C. et al - *Preventive Veterinary Medicine* 204, 105635](#)]

Rapid antigen testing for SARS-CoV-2 infection in a university setting in Ireland: learning from a 6-week pilot study

With the ongoing circulation of SARS-CoV-2 in countries across the world it is essential to identify effective ways to reduce the risk of infection while allowing society to function as close to 'normal' as possible. Serial testing using rapid lateral flow antigen tests is a possible way to do this by screening

populations in a targeted way, identifying infectious (both symptomatic and asymptomatic) people and removing them from circulation while infectious. This study evaluated a testing programme that was introduced into a university setting, assessing some of the factors that impact participation in such a study among both staff and students. Overall, almost all respondents to the survey stated that they were happy with having a testing programme present in the workplace and it helped to reduce anxiety associated with COVID-19. There were differing levels of participation among staff and students, for reasons that are discussed. Different motivations drive participation in different cohorts and different messaging/incentivisation is needed to encourage participation in those different cohorts. This project was led by Gerald Barry from the UCD School of Veterinary Medicine. [[Barry, G. et al - Public Health in Practice 3, 100255](#)]

Potential application of SARS-CoV-2 rapid antigen diagnostic tests for the detection of infectious individuals attending mass gatherings – a simulation study

Rapid Antigen Diagnostic Tests (RADTs) for the detection of SARS-CoV-2 offer advantages in that they are cheaper and faster than currently used PCR tests but have reduced sensitivity and specificity. One potential application of RADTs is to facilitate gatherings of individuals, through testing of attendees at the point of, or immediately prior to entry at a venue. Understanding the baseline risk in the tested population is of particular importance when evaluating the utility of applying

diagnostic tests for screening purposes. Using incidence data from Ireland, we developed scenarios to estimate the prevalence of infectious attendees, then simulated the likely number of positive and negative test results, the proportion of cases detected and the corresponding positive and negative predictive values, and the cost per case identified. Our findings suggest that for each reported case on a given day, there are likely to be 13.8 additional infectious individuals also present in the community. Prevalence ranged from 0.26% for “mostly older” events in July-August, to 2.6% for “mostly younger” events in January. For large events (10,000 attendees) the expected number of infectious attendees ranged from 27 (95% confidence intervals 12 to 45) for mostly older events in July-August, to 267 (95% confidence intervals 134 to 436) infectious attendees for mostly younger attendees in January. Given rapid changes in SARS-CoV-2 incidence over time, we developed an RShiny app to allow users to run updated simulations for specific events. This project was led by Conor McAloon from the UCD School of Veterinary Medicine. [[McAloon, C.G. et al - Frontiers in Epidemiology 2, 862826](#)]

***M. bovis* 2022**

The Seventh International conference on *Mycobacterium bovis* is taking place in Galway from 7-10 June 2022. To view the programme or to register for the conference, please visit <https://www.mbovis2022.com/>

This e-zine, and recent news items, can be found at: <http://www.ucd.ie/cvera/news/>

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