

University College Dublin's Centre for Veterinary Epidemiology and Risk Analysis

Simon More, professor of epidemiology and risk analysis, University College Dublin's School of Veterinary Medicine, outlines what the Centre for Veterinary Epidemiology and Risk Analysis does and how the centre provides scientific advice in support of national policy decision-making on a broad range of issues relating to animal health and welfare

The tuberculosis investigation unit (TIU) was established in May 1989, to provide research support for the national bovine tuberculosis (bTB) eradication programme. At that time, progress towards bTB eradication had stalled, with animal incidence remaining at approximately 0.5% annually. During 1989-1992, there were major changes to the programme management and substantial collaboration began between several countries, including Ireland, that were struggling with similar constraints to bTB eradication. A key report was finalised in 1990, which recommended that the programme should focus on control at least cost, with the monies saved to be used for applied research. Furthermore, it was recommended that the programme should be relaunched with the aim of final eradication once identified constraints could be overcome.

Given this context, the key objectives of the TIU throughout the 1990s were to identify and address constraints to bTB eradication in Ireland. The unit was located within the Veterinary College at University College Dublin (UCD), under the direction of Professor John D Collins. In 2004, the unit was renamed the Centre for Veterinary Epidemiology and Risk Analysis (CVERA), operating under the direction of Professor Simon J More, following the retirement of Prof Collins. Since this time, CVERA has broadened its remit – the centre's work should be seen in the context of the increasingly complex animal health challenges that are being faced, both in Ireland and within the EU more broadly. CVERA is fully funded by the Department of Food, Agriculture and the Marine (DAFM).

THE RATIONALE FOR CVERA

There are ongoing and increasing animal health threats to Ireland as a consequence of multiple global challenges, including antimicrobial resistance, climate change, geopolitical instability and the increasing movement (both controlled and otherwise) of people, animals and animal products. Transboundary animal diseases which, by definition, do not respect national borders, are of increasing concern to Europe. Examples include African Swine Fever, Lumpy Skin Disease and Sheepox and Goatpox.

There is also an increasing focus on product quality, including an explicit national focus on high-value products and markets. Animal health is a direct contributor to product quality, but is also important for international trade of

animals and animal products. Ireland has a heavy reliance on exports, noting that approximately 85% of beef and 85% of milk and milk products are exported.

The international trading environment is increasingly competitive. As a consequence of recent international events, particularly Brexit and the US elections, there is an increasingly uncertain global order, with important implications for international trade.

Ireland is facing, and reacting to, the demand for increased agricultural output. There is an increasing opportunity to reduce greenhouse gas emissions, and thereby meet EU and other commitments, through increased efficiency, in terms of production per animal, brought about by improved animal health. Animal health status also directly impacts farm income and animal welfare.



Given this context, there is a critical need for high-quality, independent scientific research and advice to support evidence-based policy making in animal health and welfare and public health by the DAFM and the wider stakeholder community. This information is central to decision-making, noting that it is very difficult (and often impossible) to resolve what we do not understand. There is also increasing scrutiny of national policy decisions at all levels: by the Irish public, by farmers through their national farm organisations, and by the European Commission. This has been driven by requirements for transparency, open government and freedom of information, and concern about the prudent use of public funds. Consequently, there needs to be a rational and defensible basis for decision-making. There is also an increasing awareness that a robust science base is needed to underpin decision-making when faced with complexity or uncertainty.

Much of the work of CVERA is published in the international

peer-reviewed scientific literature. Scientific publication is an important means to build credibility, both nationally and internationally. The work of CVERA reflects key values relevant to such credibility, including scientific excellence, independence, openness, scientific innovation and international cooperation.

CVERA'S WORK

CVERA works in close collaboration with DAFM policy and with scientists from a range of institutions, both in Ireland and internationally. The work of CVERA covers three broad areas:

- **Regulatory animal diseases.** Overseen by DAFM, areas of concern include the control or eradication of endemic animal diseases, primarily bTB but also bovine spongiform encephalopathy and bovine brucellosis. The bTB work is extremely diverse, grouped under the thematic areas of bTB in cattle, bTB epidemiology and control in wildlife, and the broader national bTB policy. CVERA also contributes to preparedness for and response to exotic animal disease threats, including Avian Influenza, African Swine Fever, Bluetongue and Lumpy Skin Disease.
- **Non-regulatory animal diseases.** In recent years, CVERA has provided services in support of national programmes managed by Animal Health Ireland (AHI), including the eradication of bovine viral diarrhoea (BVD), Johne's disease (JD) control and improved milk quality.
- **Other animal health and welfare issues.** This includes work addressing a diverse range of issues including animal welfare (relating to cattle, horses and pigs), marine animal health (farmed salmon and oysters), on-farm antimicrobial usage, concerns relating to cadmium exposure in cattle, and veterinary ethics.

The following two case studies illustrate the work of CVERA.

BOVINE TUBERCULOSIS

CVERA has been an important contributor to the national bTB eradication programme for many years, focusing on three broad strands of research, including cattle-to-cattle transmission, transmission of infection from wildlife to cattle, and research relevant to the programme more broadly. We now have a much clearer understanding of reasons for local persistence, either in a herd or locality, and of the relative contribution of infection from neighbourhood sources (wildlife, farm-to-farm) and from residually infected cattle. There is ongoing work to improve the effectiveness of both field and abattoir surveillance, and of efforts to clear known infected herds. Although the role of badgers in the epidemiology of *Mycobacterium bovis* is now clear, there have been few options to limit the drift of infection from badgers to cattle.

CVERA and collaborating partners have recently finalised analysis of the Kilkenny badger vaccine project, which is providing critical information on the potential role of badger vaccination into the future. CVERA continues to work closely with scientists in the UK to describe trends in bTB surveillance and control across the five countries of Ireland,

Northern Ireland, England, Wales and Scotland. CVERA also recently completed a detailed review to highlight lessons learned from the successful Australian bTB eradication programme.

BOVINE VIRAL DIARRHOEA

In collaboration with other organisations, CVERA has contributed substantially to the establishment of the national BVD eradication programme, and provides scientific support to its ongoing work. It presented the case for an increasing role of the private sector in national animal health, and played a central role in the establishment of Animal Health Ireland (AHI).

Subsequent research was undertaken to identify those animal health issues that should be prioritised by AHI and to assess the current BVD situation in Ireland, as well as the case for BVD eradication. In recent years, CVERA and partners have clarified the magnitude of the retention of persistently infected (PI) animals on their farm of birth and of associated risk factors, and the implications of PI retention for the retaining farm, for neighbours and for the programme more broadly.



Recent modelling work conducted in collaboration with colleagues from the Helmholtz Institute in Germany have clearly identified the delays in time to eradication that occur as a consequence of PI retention.

CVERA and AHI are also currently finalising work to quantify the role of Trojan dams in the between-herd spread of BVD virus, and of the potential benefit of measures to mitigate the risk posed by these animals in the national programme. In addition to bTB and BVD, CVERA 'with collaborators', has also published scientific research over the last several years on a broad range of other issues, including an investigative framework to facilitate epidemiological thinking during herd problem-solving, biosecurity in the farmed salmon industry, bovine respiratory disease, cadmium exposure and consequences for farmed ruminants, equine welfare, honeybee colony health, Johne's disease control, lameness in cattle, milk quality, mortality in farmed Pacific oysters, on-farm animal welfare incidents, pig welfare, private animal health and welfare standards, Schmallenberg virus, small animal epidemiology, tick-borne parasites of cattle and veterinary ethics.

Further information about CVERA is available on our website, www.ucd.ie/cvera, including all scientific publications.

As highlighted in this article, CVERA conducts research on a wide range of issues relating to animal health and welfare, and to public health. In each case, it is our aim to provide high-quality, independent, peer-reviewed scientific information upon which sound policy decisions can be made.