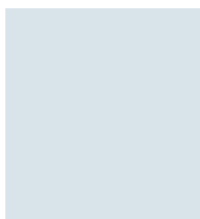


# The Centre for Veterinary Epidemiology and Risk Analysis

## The TB Diagnostics and Immunology Research Centre

### The Badger Vaccine Project

*Biennial Report, 2008-09*



Department of  
**Agriculture,  
Fisheries and Food**  
An Roinn  
**Talmhaíochta,  
Iascaigh agus Bia**



**The Centre for Veterinary Epidemiology and Risk Analysis**  
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**Biennial Report, 2008-09**

*S.J. More and D.M. Collins (editors)*

**ISBN: 978-1-905254-44-6**

## Preface

The Department of Agriculture, Fisheries and Food (DAFF) provides ongoing financial support to three research units within the UCD School of Agriculture, Food Science and Veterinary Medicine at University College Dublin:

- The Centre for Veterinary Epidemiology and Risk Analysis (CVERA);
- The TB Diagnostics and Immunology Research Centre; and
- The Badger Vaccine Project.

These units each work to support DAFF policy, inspectorate and laboratory staff in the area of animal health. The TB Diagnostics and Immunology Research Centre and the Badger Vaccine Project focus on bovine tuberculosis research. CVERA is a national resource centre, providing policy advice and conducting epidemiological research on a wide range of animal health issues. In addition, CVERA provides general support to government, industry and the veterinary profession (pre- and post-graduation) on these and other animal health issues.

This report documents work conducted by, or in association with, these three UCD-based research units during 2008 and 2009.

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*The UCD Veterinary Sciences Centre. Photograph by D.M. Collins.*

## Acknowledgements

### *The Centre for Veterinary Epidemiology and Risk Analysis*

CVERA works closely with colleagues from a wide range of organisations, as listed below, both in Ireland and internationally. Their input is gratefully acknowledged.

- *In Ireland* – DAFF (veterinary policy, inspectorate and laboratory staff – central, regional, local), the TB Diagnostics and Immunology Research Centre, the Badger Vaccine Project, UCD School of Agriculture, Food Science and Veterinary Medicine, UCD School of Applied Social Science, UCD School of Mathematical Sciences, UCD School of Public Health, Physiotherapy and Population Science, UCD Geary Institute, University College Cork, Trinity College Dublin, the National Parks and Wildlife Service (within the Department of Environment, Heritage and Local Government), Teagasc, the Marine Institute, Safefood, Cork County Council, Wexford General Hospital, Veterinary Ireland and individual private veterinary practitioners, Monaghan Veterinary Consultants, Enfer Scientific, BirdWatch Ireland, the Irish Equine Centre, the Irish Cattle Breeding Federation, Animal Health Ireland, a wide range of industry organisations, and individual Irish farmers
- *In Australia* – AusVet Animal Health Services, Camperdown Veterinary Centre, Harris Park Group
- *In Canada* – the University of Guelph
- *In Chile* – Servicio Agrícola y Ganadero
- *In Denmark* – the University of Copenhagen
- *In France* – Ecole Nationale Vétérinaire de Toulouse
- *In Germany* – Federal Institute for Risk Assessment
- *In Italy* – European Food Safety Authority, Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna
- *In Korea* – the National Veterinary Research and Quarantine Service
- *In Kyrgyzstan* – the Kyrgyz State Veterinary Department, the EU Budget Support Programme in Kyrgyzstan
- *In the Netherlands* – GD Animal Health Service Deventer, ID Lelystad, Universiteit Utrecht, Wageningen University
- *In New Zealand* – AgResearch, Massey University
- *In Norway* – Norges veterinærhøgskole (Norwegian School of Veterinary Science)
- *In Spain* – Universidad Complutense
- *In Sweden* – Swedish University of Agricultural Sciences
- *In the UK* – the Agri-Food and Bioscience Institute, the Department of Agriculture and Rural Development of Northern Ireland, veterinary organisations in Northern Ireland (North of Ireland Veterinary Association, Association of Veterinary Surgeons Practicing in Northern Ireland), Defra (the UK Department of Environment, Food and Rural Affairs), Office of the Chief Veterinary Officer in the Welsh Assembly government, Centre for Environment, Fisheries and Aquaculture Science, Fusion Antibodies Ltd., the Roslin Institute of the University of Edinburgh, Royal Veterinary College, Scottish Agricultural College, Scottish Government, Veterinary Laboratories Agency, University of Edinburgh
- *In the US* – Colorado State University, Colorado School of Public Health.

## *The TB Diagnostics and Immunology Research Centre*

Staff from the Centre acknowledge the help and support of District Veterinary Office (DVO) staff in providing samples for the IFN- $\gamma$  test.

## *The Badger Vaccine Project*

Staff working on the Badger Vaccine Project acknowledge the contribution and support of Frances Quigley and colleagues at the mycobacteriology laboratory (Central Veterinary Research Laboratory, Backweston, Celbridge, Co Kildare, Ireland), and Paddy Sleeman of University College Cork for fieldcraft. Glyn Hewinson, Mark Chambers, Sandrine Lesellier, and staff at Veterinary Laboratories Agency (VLA, UK) are also thanked for developing and carrying out many of the immunoassays used in the badger vaccine studies, and for contributing technical expertise and advice for the research programme.

*Some photographs in this report, including those on pages 9, 15 and 119, were kindly supplied by An Bord Bia. Photographs on pages 8, 62 and 108 were taken by S.J. More. Photographs on pages 84 and 118 were taken by D.M. Collins. Unless stated otherwise, all other images are copyright of Fotolia.com*

## Further information

In this report, projects are either:

- Complete, which includes those projects where relevant peer-reviewed papers, or equivalent, have been published, or
- Current, which includes the balance covering the spectrum from conceptual through to final write-up.

Manuscript preparation is conducted in accordance with Uniform Requirements for Manuscripts Submitted to Biomedical Journals of the International Committee of Medical Journal Editors (previously the Vancouver Group). For further information, see [www.icmje.org](http://www.icmje.org). Guidelines for the transparent reporting of specific study types (for example, the CONSORT statement for transparent reporting of trials, [www.consort-statement.org](http://www.consort-statement.org)) are followed.

An up-to-date list of all peer-review papers produced by, or in association with, the Centre for Veterinary Epidemiology and Risk Analysis, the TB Diagnostics and Immunology Research Centre and the Badger Vaccine Project is available at [www.ucd.ie/cvera](http://www.ucd.ie/cvera).

## Affiliated staff members

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Gabrielle Kelly and David Williams, UCD School of Mathematical Sciences, University College Dublin, Ireland

Paddy Sleeman, Department of Zoology, Ecology and Plant Science, University College Cork

Wayne Martin, University of Guelph, Canada

Francisco Olea-Popelka, Department of Clinical Sciences, Colorado State University, United States of America

Mart de Jong and Klaas Frankena, University of Wageningen, The Netherlands

### *The TB Diagnostics and Immunology Research Centre*

Eamonn Gormley (UCD)	Tara Fitzsimons (UCD)
Mairéad Doyle (UCD)	Kevina McGill (UCD)

### *The Badger Vaccine Project*

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Leigh Corner (UCD)	Elvira Ramovic (UCD)
Denise Murphy (DAFF)	Marian Teeling (UCD)
Eamon Costello (DAFF)	

## Overview

### *The Centre for Veterinary Epidemiology and Risk Analysis*

The Centre for Veterinary Epidemiology and Risk Analysis (CVERA) is the national resource centre for veterinary epidemiology in Ireland, located within the UCD School of Agriculture, Food Science and Veterinary Medicine at University College Dublin. The Centre was initially established as the Tuberculosis Investigation Unit, but in recent years has broadened its remit to cover a wide range of international, national and local animal health matters, including:

- Epidemiological support for the control and eradication of regulatory animal diseases, which includes national programmes for bovine tuberculosis, bovine brucellosis and bovine spongiform encephalopathy;
- Epidemiological support for a broad range of other animal health and welfare issues relating to emergency animal disease preparedness and response (for example, avian influenza, bluetongue and equine infectious anaemia), on-farm investigations, welfare of farmed livestock and horses, health of companion animals and farmed fish, and international collaboration; and
- Work in support of Animal Health Ireland, which is seeking to provide a proactive, coordinated and industry-led approach in Ireland to non-regulatory animal health concerns (such as mastitis, fertility and infectious bovine rhinotracheitis).

CVERA staff work closely with national policy-makers, both in government and industry. In collaboration with staff from the UCD School of Agriculture, Food Science and Veterinary Medicine, CVERA staff also contribute to on-farm animal health investigations throughout Ireland. A broad range of expertise is represented within the Centre, including agriculture and animal sciences, database development and management, geographic information systems, statistics, veterinary medicine and epidemiology. The Centre is staffed by employees of University College Dublin and of the Department of Agriculture, Fisheries and Food (DAFF).

### *The TB Diagnostics and Immunology Research Centre*

The gamma-interferon (IFN- $\gamma$ ) assay (Bovigam) is used as a tool to assist in the eradication of bovine tuberculosis from the national cattle herd. All of the testing is carried out in the laboratory based at UCD. In the period 2008-2009, over 28,000 blood samples were submitted to the laboratory for testing, including 1,300 goats. The majority of samples originated from bovine reactor re-rest herds where the test was used to identify infected animals that were missed by the skin test. Other strategic uses of the test were targeted at inconclusive reactor re-tests. The apparent sensitivity and specificity of the IFN- $\gamma$  test was re-assessed in a large-scale study involving several thousand cattle. This was part of a larger project to compare the performance of the skin test, IFN- $\gamma$  test and a new serology test developed by Enfer Group. The results of this study have helped our understanding of how the test performs in the cohorts tested. In 2010 we await the delivery of the next generation Bovigam test being developed by Prionics Ltd. The test promises improved specificity without loss of sensitivity. The laboratory at UCD will be involved in evaluating this test under Irish conditions.

## *The Badger Vaccine Project*

The Badger Vaccine Project is a comprehensive programme of research that seeks to develop a vaccine to control tuberculosis in badgers and to break the link of infection to cattle. We have demonstrated that vaccination of badgers with BCG by a number of routes, including oral delivery, generates high levels of protective immunity against challenge with *M. bovis*. The key to the success of the vaccine lies in the encapsulation of the vaccine in a specific lipid formulation that protects it from degradation as it passes through the stomach. The encapsulation technology designed for this purpose has been developed by collaborators in Otago, New Zealand. We are continuing to carry out studies with captive population of badgers to refine the vaccine and address issues relating to the eventual registration of the vaccine as a veterinary medicine. We are also developing and evaluating diagnostic tests with colleagues at VLA (Weybridge UK). The results of our studies to date have increased our understanding of the progression of the disease following infection and have improved our ability to accurately diagnose *M. bovis* infection in badgers. A field trial commenced in 2009 to test the efficacy of the oral BCG vaccine with a large number of badgers over a wide geographic area in Co. Kilkenny. Success in the field trial will lead to implementation of a vaccination strategy into the national control programme.





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ISBN: 978-1-905254-44-6