WOAH Reference Laboratory Reports Activities 2022

Activities in 2022

This report has been submitted : 25 avril 2023 16:52

Laboratory Information

Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:	Mammalian tuberculosis
Address of laboratory:	New Haw, Addlestone Surrey KT15 3NB Weybridge UNITED KINGDOM
Tel.:	+44-1932 34.11.11
E-mail address:	jason.sawyer@apha.gov.uk
Website:	https://www.gov.uk/government/organisations/animal-and-plant-health-agency
Name (including Title) of Head of Laboratory (Responsible Official):	David Holdsworth, Chief Executive
Name (including Title and Position) of WOAH Reference Expert:	Dr Jason Sawyer Head of Immunology & Vaccines Workgroup, Department of Bacteriology, APHA Weybridge
Which of the following defines your laboratory? Check all that apply:	Governmental

TOR1: DIAGNOSTIC METHODS

1. Did your laboratory perform diagnostic tests for the specified disease/topic for purposes such as disease diagnosis, screening of animals for export, surveillance, etc.? (Not for quality control, proficiency testing or staff training)

Yes

Diagnostic Test	Indicated in WOAH Manual (Yes/No)	Total number of test performed last year	
Indirect diagnostic tests		Nationally	Internationally
Gamma Interferon micro (2 antigen) assay	Yes	194804	0

Gamma interferon extended micro (3 antigen) assay	Yes	19357	24
Lateral flow serology test - camelid	No	439	0
Lateral flow serology test - badger	No	206	0
Lateral flow serology test - other	No	87	0
IDEXX ELISA serology test - bovine	Yes	9051	0
IDEXX ELISA serology test - camelid	No	2604	0
EnferPlex serology ELISA	No	1012	0
Direct diagnostic tests		Nationally	Internationally
Culture (bovine)	Yes	8187	0
Culture (non-bovine)	Yes	145	0
PCR (bovine)	Yes	636	0
PCR (non-bovine)	Yes	264	0
Whole genome sequencing (bovine)	Yes	3246	0
Whole genome sequencing (non-bovine)	Yes	326	0
DNA testing of cattle to confirm identity	No	204	0
Culture (badgers)	Yes	746	0

TOR2: REFERENCE MATERIAL

2. Did your laboratory produce or supply imported standard reference reagents officially recognised by WOAH?

No

3. Did your laboratory supply standard reference reagents (nonWOAH-approved) and/or other diagnostic reagents to WOAH Members?

Yes

TYPE OF REAGENT AVAILABLE	RELATED DIAGNOSTIC TEST	PRODUCED/ PROVIDE	AMOUNT SUPPLIED NATIONALLY (ML, MG)	AMOUNT SUPPLIED INTERNATIONALLY (ML, MG)	NO. OF RECIPIENT WOAH MEMBER COUNTRIES	COUNTRY OF RECIPIENTS
Cattle sera	Cattle TB testing & research	Provide		127 x 0.5 mL	1	Europe
Cattle blood	Cattle TB testing & research	Provide	28 x 20 mL on 10 occasions		1	Europe
Cattle blood	Cattle TB testing & research	Provide	28 x 20 mL		1	Europe
Cattle sera	Cattle TB testing & research	Provide	95 x 0.5 mL		1	Europe
Cattle blood	Cattle TB testing	Provide	500 mL			Europe

	& research					

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to WOAH Members?

No

TOR3: NEW PROCEDURES

6. Did your laboratory develop new diagnostic methods for the designated pathogen or disease?

Yes

7. Did your laboratory validate diagnostic methods according to WOAH Standards for the designated pathogen or disease?

Yes

NAME OF THE NEW TEST OR DIAGNOSTIC METHOD DEVELOPED	DESCRIPTION AND REFERENCES (PUBLICATION, WEBSITE, ETC.)
PCR for the identification of M. bovis in animal tissue	APHA has introduced the use of PCR for detection of M. bovis in animal tissue to replace culture (positive samples are subsequently cultured). At present this is for non-bovine species and slaughter house cases only. The next stage will be roll this out for samples from TB test reactor cattle in the near future. The paper describing this work has been submitted for publication. Details can be obtained by contacting the Jason Sawyer. The test has been ISO17025 accredited by UKAS.

8. Did your laboratory develop new vaccines for the designated pathogen or disease?

No

9. Did your laboratory validate vaccines according to WOAH Standards for the designated pathogen or disease?

Yes

NAME OF THE NEW VACCINE DEVELOPED	DESCRIPTION AND REFERENCES (PUBLICATION, WEBSITE, ETC.)
BCG vaccine with companion DIVA test	APHA is currently conducting field trials of BCG vaccination of cattle alongside a companion DIVA test. The aim is to obtain marketing authorisation for these products, allowing their routine use. UK government site with details: https://www.gov.uk/government/news/field-trials-for-leading-cattle-vaccine-and-skin-test-for-btb A technical paper describing the work conducted at APHA has also been submitted to WOAH.

TOR4: DIAGNOSTIC TESTING FACILITIES

10. Did your laboratory carry out diagnostic testing for other WOAH Members?

No

11. Did your laboratory provide expert advice in technical consultancies on the request of an WOAH Member?

No

TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES

12. Did your laboratory participate in international scientific studies in collaboration with WOAH Members other than the own?

Yes

Title of the study	Duration	PURPOSE OF THE STUDY	PARTNERS (INSTITUTIONS)	WOAH MEMBER COUNTRIES INVOLVED OTHER THAN YOUR COUNTRY
Replacement of the International Standard Bovine Tuberculin	On-going	Replacement of the International Standard Bovine Tuberculin	This is an international study led by WOAH	
Field evaluation of BCG vaccination in cattle	On-going	To evaluate the efficacy of BCG in cattle in field situations in Ethiopia	Armauer Hansen Research Institute and Addis Ababa University	ETHIOPIA
Evaluation of inactivated vaccine efficacy in badgers	On-going	Assess efficacy of inactivated TB vaccine in badgers	Neiker Institute & SERIDA	SPAIN
Badger bait deployment studies	On-going	Investigate uptake of baits in badger population	ANSES & ONCFS	FRANCE
Accelerating Bovine tuberculosis Control in Developing Countries – India	On-going	Improved TB control in India	Penn State University, Multiple Indian partners, Cambridge University,Universidad Complutense de Madrid, Douwe Bakker	INDIA SPAIN THE NETHERLANDS UNITED STATES OF AMERICA
Improvements in blood based TB test for cattle	On-going	Improvements in blood based TB test for cattle	University College Dublin	IRELAND
Cattle vaccine and DIVA development	On-going	Cattle vaccine and DIVA development	AgResearch	NEW ZEALAND
Improved TB skin test delivery systems	On-going	Improved TB skin test delivery systems	MIT	UNITED STATES OF AMERICA
Discovery of novel antigens for TB serology	On-going	Discovery of novel antigens for TB serology	Antigen Discovery Inc	UNITED STATES OF AMERICA

TOR6: EPIZOOLOGICAL DATA

14. Did your Laboratory collect epidemiological data relevant to international disease control?

Yes

IF THE ANSWER IS YES, PLEASE PROVIDE DETAILS OF THE DATA COLLECTED:
APHA is involved in the collection of data relevant to the bovine TB disease situation in Great Britain.

15. Did your laboratory disseminate epidemiological data that had been processed and analysed?

Yes

IF THE ANSWER IS YES, PLEASE PROVIDE DETAILS OF THE DATA COLLECTED:
Statistics and analysis of bovine TB disease situation in Great Britain are available at the following website: https://www.gov.uk/government/collections/bovine-tb

16. What method of dissemination of information is most often used by your laboratory? (Indicate in the appropriate box the number by category and list the details in the box)

a) Articles published in peer-reviewed journals:

25
Gibson AJ; Passmore IJ; Faulkner V; Xia D; Nobeli I; Stiens J; Willcocks S; Clark TG; Sobkowiak B; Werling D; VILLARREAL-RAMOS B; Wren BW; Kendall SL (2021) Probing differences in gene essentiality between the human and animal adapted lineages of the Mycobacterium tuberculosis complex using TnSeq. Frontiers in Veterinary Science 8, Article number: 760717.

ROMERO MP; Chang Y-M; Brunton LA; PARRY J; PROSSER A; UPTON P; Drewe JA (2022) Machine learning classification methods informing the management of inconclusive reactors at bovine tuberculosis surveillance tests in England. Preventive Veterinary Medicine 199, 105565.

Rossi G; Crispell J; BROUGH T; Lycett SJ; WHITE PCL; Allen A; ELLIS RJ; Gordon SV; Harwood R; PALKOPOULOU E; Presho EL; Skuce R; SMITH GC; Kao RR (2022) Phylodynamic analysis of an emergent Mycobacterium bovis outbreak in an area with no previously known wildlife infections. Journal of Applied Ecology 59 (1) 210-222.

Deneke TT; Bekele A; Moore HL; Mamo T; Almaw G; Mekonnen GA; Mihret A; Tschopp R; Yehevis L; Hodge C; Wood JLN; BERG S; The ETHICOBOTS Consortium (2022) Milk and meat consumption patterns and the potential risk of zoonotic disease transmission among urban and peri-urban dairy farmers in Ethiopia. BMC Public Health 22, Article number: 222.

Payne A; Ruette S; Jacquier M; Richomme C; LESELLIER S; MIDDLETON S; Duhayer J; Rossi S (2022) Estimation of bait uptake by badgers, using non-invasive methods, in the perspective of oral vaccination against bovine tuberculosis in a French infected area. Frontiers in Veterinary Science 9, Article 787932.

Abalos P; Valdivieso N; Perez de Val B; VORDERMEIER M; Benavides MB; Alegria-Moran R; Saadi K; Wistuba M; Ortega C; Sanchez N; Retamal P (2022) Vaccination of calves with the Mycobacterium bovis BCG strain induces protection against Bovine tuberculosis in dairy herds under a natural transmission setting. Animals 12 (9) 1083.

Retamal P; Abalos P; Alegria-Moran R; Valdivieso N; VORDERMEIER M; JONES G; Saadi K; Watt CP; Salinas C; Avila C; Padilla V; Benavides B; Orellana R (2022) Vaccination of Holstein heifers with Mycobacterium bovis BCG strain induces protection against bovine tuberculosis and higher milk production yields in a natural transmission setting. Transboundary and Emerging Diseases 69 (3) 1419-1425.

SMITH GC; Barber A; Breslin P; BIRCH C; Chambers M; DAVE D; HOGARTH P; Gormley E; LESELLIER S; Balseiro A; BUDGEY R (2022) Simulating partial vaccine protection: BCG in badgers. Preventive Veterinary Medicine 204, 105635.

Subramanian S; Srinivasan S; Selvaraju KR; Vinoli PM; Selladurai S; Ramasamy B; Kumaragurubaran K; Bakker D; VORDERMEIER M; Kapur V; Gopal DR (2022) Defined antigen skin test for Bovine tuberculosis retains specificity on revaccination with Bacillus Calmette-Guerin. Frontiers in Veterinary Science 9, Article 814227.

JONES GJ; KONOLD T; HURLEY S; HOLDER T; STEINBACH S; COAD M; Wedlock DN; Buddle BM; Singh M; VORDERMEIER HM (2022) Test performance data demonstrates utility of a cattle DIVA skin test reagent (DST-F) compatible with BCG vaccination. Scientific Reports 12, Article Number: 12052.

ROBERTSON A; PALPHRAMAND KL; McDonald RA; Middleton S; Chambers MA; DELAHAY RJ; CARTER SP (2022) Uptake of baits by wild badgers: Influences of deployment method, badger age and activity patterns on potential delivery of an oral vaccine. Preventive Veterinary Medicine 206, 105702.

Bauman J S; Pizzey R; Beckmann M; VILLARREAL-RAMOS B; King J; Hopkins B; Rooke D; Hewinson G; Mur L A J (2022) Untargeted metabolomic analysis of thoracic blood from badgers indicate changes linked to infection with Bovine tuberculosis (Mycobacterium bovis): a pilot study. Metabalomics 18 (8) 61.

Correia C N; McHugo G P ; Browne J A; McLoughlin K E; Nalpas N C; Magee D A; WHELAN A O; VILLARREAL-RAMOS B; VORDERMEIER H M; Gormley E; Gordon S V; MacHugh D E (2022) High-resolution transcriptomics of bovine purified protein derivative-stimulated peripheral blood from cattle infected with Mycobacterium bovis across an experimental time course. Tuberculosis 136 102235.

DOWNS S H; ASHFIELD S; ARNOLD M; ROBERTS T; PROSSER A; ROBERTSON A; FROST S; HARRIS K; AVIGAD R; SMITH G C (2021) Detection of a local Mycobacterium bovis reservoir using cattle surveillance data. Transboundary and Emerging Diseases 69 (4) e104-e118.

Drouin R; SOLDAN A (2022) APHA policy on 'two-times' TB IRs: Andrew Soldan, APHA Veterinary Director, responds (letter). Veterinary Record 191 (4) 164-165.

Jolma E R; DELAHAY R J; SMITH F; Drewe J A (2022) Serologic responses correlate with current but not future bacterial shedding in badgers naturally infected with Mycobacterium bovis. Transboundary and Emerging Diseases 69 (4) 1922-1932.

Almaw G; Mihret A; Abebe T; Ameni G; Gumi B; Olani A; Tamiru M; Koran T; Aliy A; Sombo M; Ayalew S; Yesuf A; Taye H; Wood J L N; BERG S; The ETHICOBOTS consortium (2022) Spoligotype analysis of Mycobacterium bovis isolates from cattle and assessment of zoonotic TB transmission among individuals working in bovine TB-infected dairy farms in Ethiopia. Zoonosis and Public Health 69 (6) 663-672.

Asai M; Li Y; SPIROPOULOS J; COOLEY W; EVEREST D J; Kendall S L; Martin C; Robertson B D; Langford P R; Newton S M (2022) Galleria mellonella as an infection model for the virulent Mycobacterium tuberculosis H37Rv. Virulence 13 (1) 1543-1557.

Courcier E A; Collins S F; McCormick C M; ARNOLD ME; Corbett D M; Ford T; McGeown C F; Barry C; Kirke R; Menzies F S (2022) The impact of BCG strains and repeat vaccinations on immunodiagnostic tests in Eurasian badgers (Meles meles). Vaccine 40 (34) 4972-4978.

Gibson A J; Stiens J; Passmore I J; Faulkner V; Miculob J; Willcocks S; COAD M; BERG S; Werling D; Wren B W; Nobeli I; VILLARREAL-RAMOS B; Kendall S L (2022) Defining the genes required for survival of Mycobacterium bovis in the bovine host offers novel insights into the genetic basis of survival of pathogenic Mycobacteria. mBio 13 (4) e00672-22.

PALMER S; WILLIAMS G A; Brady W C; Ryan E; Malczewska K; Bull T J; HOGARTH P J; SAWYER J (2022) Assessment of the frequency of Mycobacterium bovis shedding in the faeces of naturally and experimentally TB infected cattle. Journal of Applied Microbiology 133 (3) 1832-1842.

Sridhara A A; Johnathan-Lee A; Elahi R; Lambotte P; Esfandiari J; Boschiroli M; Kerr T J; Miller M A; HOLDER T; JONES G; VORDERMEIER H M; Marpe B N; Thacker T C; Palmer M V; Water W R; Lyashchenko K P (2022) Differential detection of IgM and IgC antibodies to chimeric antigens in bovine tuberculosis. Veterinary Immunology and Immunopathology 253, 110449.

WALLER E S L; BROUWER A; UPTON P A; HARRIS K A; LAWES J R; DUNCAN D; Bovine TB infection status in cattle in Great Britain in 2020. Veterinary Record 191 (11) e2513.

WILLIAMS G A; Scott-Baird E; NUNEZ A; Salguero F J; Wood E; Houghton S; VORDERMEIER H M (2022) The safety of BCG vaccination in cattle: results from good laboratory practice safety studies in calves and lactating cows. Heliyon 8 (12) e12356.

Bayissa B, Sirak A, Zewude A, Worku A, Gumi B, BERG S, Hewinson RG, Wood JLN, JONES GJ; ETHICOBOTS consortium; VORDERMEIER HM, Ameni G. Field evaluation of specific mycobacterial protein-based skin test for the differentiation of Mycobacterium bovis-infected and Bacillus Calmette Guerin-vaccinated crossbred cattle in Ethiopia. Transbound Emerg Dis. 2022 Jul;69(4):e1-e9.

b) International conferences:

14
Birch Colin An analysis of the impact of badger control on bovine tuberculosis in England ISVEE 16th International Symposium of Veterinary Epidemiology and Economics 2022 7-12 August 2022

APHA presentations from M bovis 22 conference Galway, Ireland June 7-10 2022:

Gene essentiality studies in Mycobacterium bovis offers novel insights into the genetic basis of virulence for the bovine pathogen. Dr Amanda J Gibson, Ms Jennifer Stiens , Dr Ian Passmore , Dr Valwynne Faulkner, Mr Josephous Miculob , Dr Sam Willcocks , Dr Michael Coad , Dr Stefan Berg , Professor Dirk Werling , Professor Brendan Wren , Dr Irene Nobeli , Professor Bernardo Villarreal-Ramos , Dr Sharon Kendall

One Health and Bovine Tuberculosis: The Long and Winding Road. Prof Glyn Hewinson, Dr Bernardo Alonso, Dr Maria Laura Boschiroli , Dr Antonino Caminiti , Dr Randal Capsel, Prof Steven Edwards , Dr Mei Mei Ho , Dr Lucia de Juan , Dr Ad Koets, Dr Jeanet van der Goot, Prof Vivek Kapur, Prof Martin Vordermeier, Dr Simona Forcella, Dr Premanshu Dandapat, Dr Solomon Gebredufe, Dr Glen Gifford

Using computer simulation models to assess potential impacts of changes to primary bovine tuberculosis surveillance testing of cattle in England. Dr. Colin Birch, Mr. Richard Budgey , Mr. Tom Doherty, Dr. Oliver Tearne , Professor Rowland Kao, Dr. Mark Arnold , Professor Graham Smith

Vaccinating badgers in a post-cull landscape; insights from the field. Dr Clare Benton, Dr Jess Phoenix, Dr Andrew Robertson, Professor Richard Delahay

What we have learnt about oral BCG vaccination of badgers. Dr Sandrine Lesellier, Dr Colin Birch, Mr Dipesh Dave, Dr Sonya Gowtage, Dr Gareth WIlliams, Dr Roland Ashford, Mrs SI Palmer , Mrs Deanna Dalley, Prof Mark Chambers

Use of Dual Path Platform VetTB test in the Test, Vaccinate or Remove wildlife research intervention project in Northern Ireland Dr Emily Courcier, Dr Mark Arnold, Ms Ana Pascual-Linaza, Mr Carl McCormick, Dr David Corbett, Mr Nigel Trimble, Mr Shane Collins, Ms Clare McGeown, Dr Jim McNair, Dr Suzan Thompson, Dr Tony Patterson, Dr Fraser Menzies

Flexible extended gamma and antibody testing - expanding the BTB surveillance toolkit in Wales. Dr Paul Schroeder, Mr David C Harris, Dr Shelley Rhodes

Towards the development of a molecularly defined tuberculin skin test to detect Mycobacterium bovis infected cattle. Dr H. Martin Vordermeier, Dr Sonya Middleton, Dr Sabine Steinbach, Dr Colm Brady, Dr Anthony Duignan, Mr Jimmy Wiseman, Professor Eamon Gormley , Dr Gareth Jones

Estimating the direct efficacy of BCG vaccination against bovine tuberculosis. Abebe Fromsa, Andrew JK Conlan, Sreenidhi Srinivasan, Wogene Bedada, Balako Gumi, Gobena Ameni, Matios Lakew, Biniam Tadesse, Stefan Berg, Solomon Gebre, James Wood, Douwe Bakker, Martin Vordermeier, Vivek Kapur

Field trials for a Cattle Tuberculosis Vaccine and companion DIVA test reagent. Nick Coldham, Gareth Jones, Martin Vordermeier, Adrian McGoldrick and Philip Hogarth

Insights for the operational interpretation of Mycobacterium bovis sequence data to elucidate the role of wildlife in cattle TB outbreaks. Prof. Rowland Kao, Dr. Adrian Allen, Dr. Chris Banks, Dr. Clare H. Benton, Prof. Richard J. Delahay, Prof. Stephen V. Gordon, Dr. Daniel J. O'Brien, Dr. Eleftheria Palkopoulou, Prof. Robin A. Skuce, Dr. Graham C. Smith

Temporal and spatial Mycobacterium bovis prevalence patterns as evidenced in passive badger surveillance across Wales. 2014-21 Dr Paul Schroeder, Mr Home Galloway , Prof Glyn Hewinson, Dr Jeff Jones , Mrs Beverley Hopkins , Dr Simon Rolfe

Horizon scanning- what next for TB control in England? Dr James McCormack

c) National conferences:

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Jason Sawyer Assessment of the frequency of Mycobacterium bovis shedding in the faeces of naturally and experimentally TB infected cattle Acid Fast Club Summer Conference 2022 University of Abersytwyth June 30th-1st July 2022

d) Other (Provide website address or link to appropriate information):

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

17. Did your laboratory provide scientific and technical training to laboratory personnel from other WOAH Members?

No

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO17025	PDF	17025 certificate 2022.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
ISO9001:2015	Bureau Veritas

20. Does your laboratory maintain a “biorisk management system” for the pathogen and the disease concerned?

Yes

APHA operates a biorisk management system which aligns with recognised good and best practice standards including the Laboratory Biorisk Management Standard (CWA 15793). This includes a dedicated Health and Safety Team and detailed Health, Safety and Biorisk policies and practices.

TOR9: SCIENTIFIC MEETINGS

21. Did your laboratory organise scientific meetings related to the pathogen in question on behalf of WOAH?

No

22. Did your laboratory participate in scientific meetings related to the pathogen in question on behalf of WOAH?

No

TOR10: NETWORK WITH WOAH REFERENCE LABORATORIES

23. Did your laboratory exchange information with other WOAH Reference Laboratories designated for the same pathogen or disease?

Yes

24. Are you a member of a network of WOAH Reference Laboratories designated for the same pathogen?

Yes

PURPOSE OF THE PROFICIENCY TESTS: 1	ROLE OF YOUR REFERENCE LABORATORY (ORGANISER/ PARTICIPANT)	NO. PARTICIPANTS	PARTICIPATING WOAH REF. LABS/ ORGANISING WOAH REF. LAB.

25. Did you organise or participate in inter-laboratory proficiency tests with WOAH Reference Laboratories designated for the same pathogen?

No

26. Did your laboratory collaborate with other WOAH Reference Laboratories for the same disease on scientific research projects for the diagnosis or control of the pathogen of interest?

No

TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING

27. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than WOAH Reference Laboratories for the same pathogen?

No

TOR12: EXPERT CONSULTANTS

28. Did your laboratory place expert consultants at the disposal of WOAH?

29. Additional comments regarding your report: