OIE Reference Laboratory Reports Activities

Activities in 2019

This report has been submitted : 2020-03-06 13:17:11

Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Bovine tuberculosis
Address of laboratory:	Animal and Plant Health Agency New Haw, Addlestone Surrey KT15 3NB Weybridge UNITED KINGDOM
Tel.:	+44-1932 34.11.11
Fax:	+44-1932 34.70.46
E-mail address:	glh14@aber.ac.uk
Website:	https://www.gov.uk/government/organisations/animal-and-plant-health-agency
Name (including Title) of Head of Laboratory (Responsible Official):	Mr Chris Hadkiss, CEO
Name (including Title and Position) of OIE Reference Expert:	Professor Glyn Hewinson
Which of the following defines your laboratory? Check all that apply:	Governmental

ToR 1: To use, promote and disseminate diagnostic methods validated according to OIE Standards

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 OIE Manual (Yes/No)	Total number of test performed last year	
Indirect diagnostic tests		Nationally	Internationally
Gamma interferon micro (2 antigen) assay	Yes	325357	0
Gamma interferon extended micro (3	Yes	6609	0
Lateral flow serology test - camelid	No	1709	0
Lateral flow serology test - badger	No	209	0
Lateral flow serology test - other	No	60	0
IDEXX ELISA serology test - bovine	Yes	3931	0
IDEXX ELISA serology test - camelid	No	1150	2
EnferPlex serology ELISA - camelid	No	2741	0
Direct diagnostic tests		Nationally	Internationally
Culture (bovine)	Yes	8649	0
Culture (non bovine)	Yes	500	0
Spoligotyping (bovine)	Yes	3472	0
VNTR (bovine)	Yes	3338	0
HAIN and multiplex PCR	Yes	0	0
Spoligotyping (non-bovine)	Yes	488	0
VNTR (non-bovine)	Yes	462	0
DNA testing of cattle to confirm identity	No	229	0
Culture (badgers)	No	1223	0

ToR 2: To develop reference material in accordance with OIE requirements, and implement and promote the application of OIE Standards.
To store and distribute to national laboratories biological reference products and any other reagents used in the diagnosis and control of the designated pathogens or disease.

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

No

3. Did your laboratory supply standard reference reagents (non OIE-approved) and/or other diagnostic reagents to OIE Member Countries?

Yes

Type of reagent available	Related diagnostic test	Produced/ provide	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	No. of recipient OIE Member Countries	Region of recipients
Badger TB IGRA test antibodies	Badger TB IGRA ELISA	Provide	1500 ug	0	1	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East
Cattle IGRA controls	Bovigam	Provide		700 mL	10	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East
Cattle DIVA skin test cocktail proteins	Cattle TB testing & research	Provide		2.5 mL		☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
Bovine IL-22	Cattle TB testing & research	Provide		1.3 mL		☒Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
Anti-IL-22 antibodies	Cattle TB testing & research	Provide		1.6 mL		☒Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
Anti-IL-17 antibodies	Cattle TB testing & research	Provide		0.5 mL		☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East

Bovine IL-22	Cattle TB testing & research	Provide		0.2 mL		☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East
Potential skin test antigens	Cattle TB testing & research	Provide		25 mL		☐Africa ☐Americas ☒Asia and Pacific ☒Europe ☐Middle East
Potential DIVA blood test antigens	Cattle TB testing & research	Provide		30 mL		☐Africa ☐Americas ☒Asia and Pacific ☒Europe ☐Middle East

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to OIE Member Countries?

No

ToR 3: To develop, standardise and validate, according to OIE Standards, new procedures for diagnosis and control of the designated pathogens or diseases

6. Did your laboratory develop new diagnostic methods validated according to OIE Standards for the designated pathogen or disease?

No

7. Did your laboratory develop new vaccines according to OIE Standards for the designated pathogen or disease?

No

ToR 4: To provide diagnostic testing facilities, and, where appropriate, scientific and technical advice on disease control measures to OIE Member Countries

8. Did your laboratory carry out diagnostic testing for other OIE Member Countries?

No

9. Did your laboratory provide expert advice in technical consultancies on the request of an OIE Member Country?

No

ToR 5: To carry out and/or coordinate scientific and technical studies in collaboration with other laboratories, centres or organisations

10. Did your laboratory participate in international scientific studies in collaboration with OIE Member Countries other than the own?

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	OIE Member Countries involved other than your country
Field evaluation of BCG vaccination in cattle	on-going	To evaluate the efficacy of BCG in cattle in field situations in Ethiopiat	Armauer Hansen Research Institute and Addis Ababa Universityt	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	TB control in India	Penn State University, Multiple Indian partners, Cambridge University,Universidad Complutense de Madrid, Douwe Bakker	INDIA SPAIN UNITED KINGDOM 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
Replacement of the International Standard Bovine Tuberculin	on-going	To produce a replacement International Standard Bovine Tuberculin	This is an International Study led by the OIE	FIJI

ToR 6: To collect, process, analyse, publish and disseminate epizootiological data relevant to the designated pathogens or diseases

11. Did your Laboratory collect epizootiological 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

12. Did your laboratory disseminate epizootiological 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 availble at the following website: https://www.gov.uk/government/collections/bovine-tb

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

a) Articles published in peer-reviewed journals: 30

Barbour K; McClune DW; DELAHAY RJ; Speakman JR; McGowan NE; Kostka B; Montgomery WI; Marks NJ; Scantlebury DM (2019)
No energetic cost of tuberculosis infection in European badgers (Meles meles).
Journal of Animal Ecology 88 (12) 1973-1985.

BULL NC; Stylianou E; KAVEH DA; Pinpathomrat N; Pasricha J; Harrington-Kandt R; GARCIA-PELAYO MC; HOGARTH PJ; McShane H (2019)
Enhanced protection conferred by mucosal BCG vaccination associates with presence of antigen-specific lung tissue-resident PD-1+ KLRG1-CD4+ T cells.
Mucosal Immunology 12, 555-564.

Chandran A; Williams K; Mendum T; Stewart G; Clark S; Zadi S; McLeod N; Williams A; VILLARREAL-RAMOS B; VORDERMEIER M; Maroudam V; Prasad A; Bharti N; Banerjee R; Kasibhatla SM; McFadden J (2019)
Development of a diagnostic compatible BCG vaccine against Bovine tuberculosis.
Scientific Reports 9 Article number: 17791.

COAD M; Doyle M; STEINBACH S; Gormley E; VORDERMEIER M; JONES G (2019)
Simultaneous measurement of antigen-induced CXCL10 and IFN-gamma enhances test sensitivity for bovine TB detection in cattle.
Veterinary Microbiology 230, 1-6.

Crispell J; BENTON CH; Belaz D; De Maio N; Ahkmetova A; Allen A; Biek R; Presho EL; DALE J; Hewinson G; Lycett SJ; Nunez-Garcia J; Skuce RA; Trewby H; Wilson DJ; Zadoks RN; DELAHAY RJ; Kao RR (2019)
Combining genomics and epidemiology to analyse bi-directional transmission of Mycobacterium bovis in a multi-host system.
eLife 8 e45833.

DALLEY D; Lesellier S; Salguero FJ; CHAMBERS MA (2019)
Purification and characterisation of badger IgA and its detection in the context of tuberculosis.
Veterinary Sciences 6 (4) 89.

DOWNS SH; PROSSER A; ASHTON A; ASHFIELD S; Brunton L; BROUWER A; UPTON P; ROBERTSON A; Donnelly CA; PARRY JE (2019)
Assessing effects from four years of industry-led badger culling in England on the incidence of bovine tuberculosis in cattle, 2013-2017.
Scientific Reports 9, Article No. 14666

Fielding HR; McKinley TJ; Silk MJ; DELAHAY RJ; McDonald RA (2019)
Contact chains of cattle farms in Great Britain.
Royal Society Open Science 6 (2) 180719.

Hauer A; Michelet L; Cochard T; Branger M; NUNEZ J; Boschiroli M-L; Biet F (2019)
Accurate phylogenetic relationships among Mycobacterium bovis strains circulating in France based on whole genome sequencing and single nucleotide polymorphism analysis.
Frontiers in Microbiology 10 Article 955.

Infantes-Lorenzo JA; DAVE D; Moreno I; ANDERSON P; LESELLIER S; Gormley E; Dominguez L; Balseiro A; Gortazar C; Dominguez M; Salguero FJ (2019)
New serological platform for detecting antibodies against Mycobacterium tuberculosis complex in European badgers.
Veterinary Medicine and Science 5 (1) 61-69.

LESELLIER S; Boschiroli M-L; Barrat J; Wanke C; SALGUERO FJ; Garcia-Jimenez WL;
NUNEZ A; GODINHO A; SPIROPOULOS J; PALMER S; DAVE D; ANDERSON P; Boucher J-M; de Cruz K; Henault S; Michelet L; GOWTAGE S; WILLIAMS GA;
NADIAN AK; Monchatre-Leroy E; Boue F; CHAMBERS MA; Richomme C (2019)
Detection of live M. bovis BCG in tissues and IFN-γ responses in European badgers (Meles meles) vaccinated by oropharyngeal instillation or directly in the ileum.
BMC Veterinary Research 15 Article 445.

May E; PROSSER A; DOWNS SH; Brunton LA (2019)
Exploring the risk posed by animals with an inconclusive reaction to the bovine tuberculosis skin test in England and Wales.
Veterinary Sciences 6 (4) 97.

Mekonnen GA; Ameni G; Wood JLN; The ETHICOBOTS consortium; BERG S;
Conlan AJK (2019)
Network analysis of dairy cattle movement and associations with bovine tuberculosis spread and control in emerging dairy belts of Ethiopia.
BMC Veterinary Research 15:262

Mekkonen GA; Conlan AJK; BERG S; Ayele BT; Alemu A; Guta S; Lakew M;
Tadesse B; Gebre S; Wood JLN; Ameni G; The ETHICOBOTS consortium (2019) Prevalence of bovine tuberculosis and its associated risk factors in the emerging dairy belts of regional cities in Ethiopia.
Preventive Veterinary Medicine 168, 81-89

Mekonnen D; Derbie A; Abeje A; Shumet A; Nibret E; Biadglegne F; Munshae A; Bobosha K; Wassie L; BERG S; Aseffa A (2019)
Epidemiology of tuberculous lymphadenitis in Africa: a systematic review and
meta-analysis.
PLoS ONE 14 (4): e0215647

Mendum, TA; Chandran, A; Williams, K; VORDERMEIER HM; VILLARREAL-RAMOS B; Wu, H; Singh, A; Smith, AA; Butler, RE; Prasad, A; Bharti, N; Banerjee, R;
Kasibhatla, SM; Bhatt, A; Stewart, GR; McFadden, J (2019)
Transposon libraries identify novel Mycobacterium bovis BCG genes involved in the dynamic interactions required for BCG to persist during in vivo passage in cattle.
BMC Genomics 20 (1) 431

Middlemiss C; DE LA RUA-DOMENECH R; DOWNS S; SMITH G; BROWN E; MCCORMACK J; WADE C; HOGARTH P; GERRARD Z (2019)
TB testing and levels of bovine TB in England (letter).

Veterinary Record 185 (21) 664.

Mullineaux E; Phoenix J; BROWN E (2019)
Rehabilitating and releasing badgers in England.
In Practice 41 (5) 198-204

O'Connor CM; Abid M; Walsh AL; Behbod B; ROBERTS T; Booth LV; Thomas HL; SMITH NH; PALKOPOULOU E; DALE J; NUNEZ-GARCIA J; Morgan D (2019)
Cat-to-human transmission of Mycobacterium bovis, United Kingdom.
Emerging Infectious Diseases 25 (12) 2284-2286.

PERRIN LD; GIBBENS JC; DONNELLY CA; VIAL F; DELAHAY RJ; HEASMAN L; BRUNTON L; ROBERTSON A; ENTICOTT G; DOWNS SH (2019)
How can good biosecurity reduce the incidence of bovine tuberculosis?
In: McIntyre KM (ed); Nielsen LR (ed), Society for Veterinary Epidemiology and Preventive Medicine: proceedings of a meeting held in Utrecht, the Netherlands, 27th - 29th March 2019, 233-246.

PERRIN LD; HARRIS KA; REYNOLDS M; LAWES JR; FROST S; BROUWER A;
DALE J; PALKOPOULOU E; UPTON PA (2019)
Bovine TB infection status in cattle in Great Britain in 2017.
Veterinary Record 184 (12) 371-378.

Phipps E; McPhedran K; Edwards D; Russell K; O'Connor CM; Gunn-Moore DA; O'Halloran C; ROBERTS T; Morris J (2019)
Bovine tuberculosis in working foxhounds: lessons learned from a complex public health investigation.
Epidemiology and Infection 147 e24

ROBERTSON A; JUDGE J; WILSON GJ; VERNON IJ; DELAHAY RJ;
McDonald RA (2019)
Predicting badger visits to farm yards and making predictions available to farmers.
PLoS ONE 14(5): e0216953

Saleem I; Coombes AGA; CHAMBERS MA (2019)
In vitro evaluation of Eudragit matrices for oral delivery of BCG vaccine to animals.
Pharmaceutics 11 (6) 270

Srinivasan S; JONES G; Veerasami M; STEINBACH S; Holder T; Zewude A; Fromsa A; Ameni G; Easterling L; Bakker D; Juleff N; Gifford G; Hewinson RG;
VORDERMEIER HM; Kapur V (2019)
A defined antigen skin test for the diagnosis of bovine tuberculosis.
Science Advances 5 (7) eaax4899.

Stedman A; CHAMBERS MA; Gutierrez-Merino J (2019)
Secretion and functional expression of Mycobacterium bovis antigens MPB70 and MPB83 in lactic acid bacteria.
Tuberculosis 117 24-30

STEINBACH S; VORDERMEIER HM; JONES GJ (2019)
Potential of the dual IFN-gamma/IL-2 fluorescence-immunospot assay to distinguish different stages in bovine tuberculosis.
Veterinary Immunology and Immunopathology 217 109930.

Tanner R; VILLARREAL-RAMOS B; VORDERMEIER HM; McShane H (2019)
The humoral immune response to BCG vaccination.
Frontiers in Immunology 10 Article 1317

WILLIAMS GA; Koenen ME; Havenaar R; WHEELER P; GOWTAGE S; LESELLIER S; CHAMBERS MA (2019)
Survival of Mycobacterium bovis BCG oral vaccine during transit through a dynamic in vitro model simulating the upper gastrointestinal tract of badgers.

PLoS ONE 14 (4): e0214859.

WILSON L (2019)
An overview of TB in goats: risks to public health from the spread of
Mycobacterium bovis in unpasteurised goats' milk.
Goat Veterinary Society Journal 35, 8-16.

b) International conferences: 3
Coad, M. “Characterisation of CXCL-10 production and diagnostic potential for Bovine TB in cattle” at the International Veterinary Immunology Symposium Seattle August 2019.

Vordermeier M.V. Recognition of mycobacterial mycoketides by bovine T cells from infected or vaccinated cattle. 50th Annual conference of Union against TB and Lung Diseases in Hyderabad Oct 2019

Sawyer J Validation of a PCR for detection of TB in cattle tissues at APHA European Union Reference Laboratory for Bovine Tuberculosis Workshop. Madrid, 23rd-24th

c) National conferences: 1
Aber TB Conference on Diagnosis of Bovine Tuberculosis:
Current practice and Future Innovations 17th June 2019, Aberystwyth University. Various APHA speakers. Programme at
https://www.aber.ac.uk/en/ibers/research-and-enterprise/research/vethub1/abertb-conference-2019/

d) Other:
(Provide website address or link to appropriate information) 1
Annual reports on bTB in GB in 2018 were published
https://www.gov.uk/government/collections/bovine-tb-surveillance-in-great-britain

ToR 7: To provide scientific and technical training for personnel from OIE Member Countries
To recommend the prescribed and alternative tests or vaccines as OIE Standards

14. Did your laboratory provide scientific and technical training to laboratory personnel from other OIE Member Countries?

Yes

a) Technical visits: 1
b) Seminars: 0
c) Hands-on training courses: 0
d) Internships (>1 month): 0

Type of technical training provided (a, b, c or d)	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
a	Spain	1

ToR 8: To maintain a system of quality assurance, biosafety and biosecurity relevant for the pathogen and the disease concerned

15. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)
ISO17025	17025 certificate.pdf
ISO9001:2015	ISO9001-2015_Certificate.pdf

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Culture (bovine and non bovine)	UKAS
Gamma interferon ELISA	UKAS

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

Yes

(See Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, Chapter 1.1.4)

ToR 9: To organise and participate in scientific meetings on behalf of the OIE

18. Did your laboratory organise scientific meetings on behalf of the OIE?

No

19. Did your laboratory participate in scientific meetings on behalf of the OIE?

No

ToR 10: To establish and maintain a network with other OIE Reference Laboratories designated for the same pathogen or disease and organise regular inter-laboratory proficiency testing to ensure comparability of results

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

Yes

21. Was your laboratory involved in maintaining a network with OIE Reference Laboratories designated for the

same pathogen or disease by organising or participating in proficiency tests?

No

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

No

ToR 11: To organise inter-laboratory proficiency testing with laboratories other than OIE Reference Laboratories for the same pathogens and diseases to ensure equivalence of results

23. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than OIE Reference Laboratories for the same disease?

Yes

Note: See Interlaboratory test comparisons in: Laboratory Proficiency Testing at: http://www.oie.int/en/our-scientific-expertise/reference-laboratories/proficiency-testing see point 1.3

Purpose for inter-laboratory test comparisons[1]	No. participating laboratories	Region(s) of participating OIE Member Countries
TB EURL organised PT scheme: Direct extraction and bacteriological culture PT scheme	29	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East
TB EURL organised PT scheme: IFN gamma test	15	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East

ToR 12: To place expert consultants at the disposal of the OIE

24. Did your laboratory place expert consultants at the disposal of the OIE?

Yes

Kind of consultancy	Location	Subject (facultative)
ad hoc Group meetings	telephone and email communication	A new international standard for bovine tuberculin
Meeting of the OIE ad hoc Group	OIE Headquarters, Paris	Meeting of the OIE ad hoc Group to finalise the International Standard Bovine Tuberculin (ISBT) replacement project, and revise the Terrestrial Manual Chapter 3.4.6 Bovine Tuberculosis

25. Additional comments regarding your report: