World Organisation for Animal Health

Elodie Rousset - - FRANCE

WOAH Reference Laboratory Reports Activities 2025

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LABORATORY INFORMATION

***Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:**	Q fever
***Address of laboratory:**	Laboratoire de Sophia, UFQa, Les Templiers, 105 Route des Chappes, 06410 BIOT
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***E-mail address:**	elodie.rousset@anses.fr
Website:	https://www.anses.fr/en/content/reference-activities-sophia-antipolis-laboratory; https://www.anses.fr/en/content/q-fever-disease-can-be-passed-ruminants-humans
***Name (including Title) of Head of Laboratory (Responsible Official):**	Marie-Pierre RIVIERE
***Name (including Title and Position) of WOAH Reference Expert:**	Elodie ROUSSET
***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
ELISA (ruminant serum)	Yes	2	0
Direct diagnostic tests		Nationally	Internationally

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
Calibrated ELISA serum	ELISA serology (ruminant serum)	Produced and provided	22.0 mL	5.6 mL	69	FRANCE, ITALY, THE NETHERLANDS,
Genomic DNA standard for quantification (PCR)	PCR and molecular biology	Produced and provided	0.1 mL	0 mL	2	FRANCE,
Bacterial suspension (PCR)	PCR and molecular biology	Produced and provided	7.0 mL	3.0 mL	10	FRANCE, ITALY, THE NETHERLANDS,

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4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to WOAH Members?

TOR3: NEW PROCEDURES

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

Yes

Name of the new test or diagnostic method developed	Description and References (Publication, website, etc.)
Genotyping PCR (Cox51 marker) for Coxiella burnetii strain characterisation (Sanger sequencing-based)	Developed/optimised and used for research strain characterisation within Q-Net-Assess and QNET-OSCAR to support harmonised workflows from sampling to genotyping and metadata sharing. In 2025, 350 Cox51 PCRs were performed (national origin samples), with 81 successful genotypes. Not used for routine diagnosis, surveillance, export testing or any official purpose. A joint deliverable/publication is in project within Q-Net-Assess; project website: https://q-net-assess.com/
Alternative virulence model using Galleria mellonella larvae for relative virulence assessment of Coxiella burnetii	Developed as a 3Rs-aligned, intermediate virulence assessment tool within Q-Net-Assess to support methodological development for strain characterisation (proof-of-concept under consolidation: reproducibility/calibration and logistics). In 2025, 390 larval injections were performed using Nine Mile (Phase I and Phase II) axenic culture material. Not used for routine diagnosis, surveillance, export testing or any official purpose. A Q-Net-Assess publication/deliverable is in project; project website: https://q-net-assess.com/
Strain isolation and culture workflows (cell culture and axenic culture) – SOP development	Methods developed/optimised for research and methodological development (Q-Net-Assess, QNET-OSCAR, DIGECOX), including matrix-adapted variants (e.g. placenta, vaginal swabs) and cell/axenic approaches. In 2025, 137 culture attempts were performed, leading to 19 successful isolates. Not used for routine diagnosis, surveillance, export testing or any official purpose. Publications in project (Q-Net-Assess); project website: https://q-net-assess.com/ Culture-based strain work (isolation and method development) was conducted for research purposes (Q-Net-Assess, QNET-OSCAR, DIGECOX), with 137 culture attempts (cell and/or axenic culture) and 19 successful isolates; this activity was not part of routine diagnosis/surveillance/export and is therefore not reported under TOR1.
dPCR Triplex for Coxiella burnetii quantification	Developed/used exclusively for research quantification and method development (including support to strain isolation/production activities in Q-Net-Assess/QNET-OSCAR and DIGECOX, and a longitudinal anaerobic digester study). . Supporting report/documentation available (METHARISK report, June 2025) here : https://www.gdsfrance.org/metharisk-comprendre-et-limiter-les-risques-sanitaires/ In 2025, 450 dPCR assays were performed. Not used for routine diagnosis, surveillance, export testing or any official purpose.

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

No

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

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

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?

Yes

Name of the WOAH Member Country receiving a technical consultancy	Purpose	How the advice was provided
UNITED KINGDOM	Scientific/technical advice on Coxiella burnetii inactivation and potential impact of heat treatments on multi-pathogen PCR performance/interpretation (biosafety vs analytical performance).	Remote (email). Written expert response with literature-based synthesis, highlighting uncertainties/limitations and recommendations for interpretation/validation.
FRANCE	Scientific advice on off-label vaccination strategy in sheep (risk management, post-vaccination monitoring, biosafety), including clarification of evidence level and operational options.	Remote (email). Structured written advice with state-of-the-art summary and practical recommendations; developed in consultation with UFQa team/experts as needed.

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FRANCE	Technical clarification on potential transmission via semen: risk appraisal, limits of available diagnostics and level of evidence to support decision-making.	Remote (email). Collegial exchange within the expert network (GI Fièvre Q / ESA) framework; critical review and written synthesis with clear statement of uncertainties (no official recommendation if evidence insufficient).
FRANCE	Methodological advice on Q fever serology in horses (interpretation limits, cut-off issues, regulatory/accreditation scope), and guidance on exploratory approach and publication reference.	Remote (email). Written methodological advice (evidence review + limitations), including clarification of non-routine/non-official nature and suggestions for cautious interpretation.

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
Q-Net-Assess : Improved molecular surveillance and assessment of host adaptation and virulence of Coxiella burnetii in Europe	40 months	To enable Europe-wide molecular surveillance of Coxiella burnetii strains by developing and harmonising innovative strain characterisation methods and interoperable data/metadata sharing workflows, supporting One Health surveillance and risk assessment (ERA-NET ICRAD / Q-Net-Assess).	FLI, NEIKER, SCIENSANO, Royal GD and GDZ, MRI, INRAE	BELGIUM FRANCE GERMANY SPAIN THE NETHERLANDS UNITED KINGDOM

13. In exercising your activities, have you identified any regulatory research needs* relevant for WOAH?

Yes

Research need : 1

Please type the Research need: Characterization of Strains: Molecular surveillance, Phylogenetic (phylogeography, phylodynamy), Resistant properties of Coxiella burnetii in environmental conditions Calibration of inocula strain for inter- and intra-strains comparison (taking into acount phase 1 ou phase 2 forms, small or large cell variant or spore-like forms, number of viable bacteria with clear metrics (genome equivalents vs viable organisms)) Pragmatic herd-level case definitions for ruminant holdings aligned to surveillance objectives, plus minimum surveillance/reporting standards to improve international comparability Isolation methods (cell or axenic medium, robust and shareable SOPs) and viability tests from complex matrices (dust, manure, milk, ...) DIVA vaccine, with harmonised monitoring approaches

Relevance for WOAH Disease Control, Capacity Building, Standard Setting, Animal Welfare, Facilitation of international collaboration, One Health collaboration,

Relevance for the Code or Manual Code, Manual,

Field Epidemiology and Surveillance, Diagnostics, Vaccines,

Animal Category Terrestrial,

Disease:

Q fever

Kind of disease (Zoonosis, Transboundary diseases) Zoonosis, Transboundary diseases, Airborn diseases, Vectorial diseases,

Additional keywords if needed: One keyword per entry

Case definitions

If any, please specify relevance for Codes or Manual, chapter and title

(e.g. Terrestrial Manual Chapter 2.3.5 - Minimum requirements for aseptic production in vaccine manufacture)

Answer:

Notes:

Answer: Preventive management, robust diagnostic methods, Case defintions according to objectives.

TOR6: EPIZOOLOGICAL DATA

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

No

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:

Since 2021, our team contributes as experts to the annual European Food Safety Authority / European Centre for Disease Prevention and Control EU One Health Zoonoses reporting process for Q fever. We support the progressive improvement of data structure and interpretability across countries, with stepwise refinements such as: (i) inclusion of herd-level information in addition to animal-level data when available, (ii) distinction between pooled samples (e.g. bulk tank milk) and individual samples, and (iii) clearer separation of direct detection results versus serological results.

Important limitations remain due to heterogeneous national surveillance systems, lack of standardised protocol definitions for Q fever surveillance, and variable country representativeness, which currently constrain comparability and trend interpretation at EU level.

In 2025, the French national animal health surveillance platform (Plateforme ESA) developed STATELCOX 2.0, a harmonised herd/workshop-level protocol combining animal and environmental matrices and a graded interpretation framework. If adopted more widely, it could support more consistent collection and interpretation of herd-level information across field investigations and contextual surveillance settings (e.g. public-access farms, post-intervention follow-up), complementing abortion-focused approaches. STATELCOX 2.0 is a decision-support tool and does not aim to provide certification or regulatory status; the protocol and explanatory

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:

2

de Souza Ribeiro Mioni, M., D. Alves de França, A. Nunes da Cruz Encide Sampaio, A. Sossai Possebon, W. Sirley Reis Teixeira, B. Devidé Ribeiro, M. Bahia Labruna, F. Borges Costa, K. Sidi-Boumedine, J. Gonçalves Pereira, E. Rousset, R. Thiéry, F. C. Pereira dos Santos, S. Colombo, F. S. Possebon, and J. Megid. 2025. "Comparison of In-House Immunofluorescence Assay (IFA) and Commercial Enzyme-Linked Immunosorbent Assay (ELISA) for Coxiella burnetii Infection in Cattle." Veterinary Research Communications. Advance online publication.

van den Brom, René, Susan Neale, Elsa Jourdain, Anneleen Matthijs, Marcella Mori, Elodie Rousset, Katja Mertens-Scholz, Tom N. McNeilly, and Ana Hurtado. 2025. "Detection of Abortifacient Agents in Domestic Ruminants, with a Specific Focus on Coxiella burnetii." Open Research Europe 5:94. doi:10.12688/openreseurope.19270.2.

b) International conferences:

1

Rousset, E., and Collaborators. 2025. "Diagnostic Tools Available for Ruminants, Their Known Performances and Expected Developments." Oral presentation, QFIG Q Fever Symposium, June 15, Byron Bay & online.

c) National conferences:

0

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

4

Plateforme nationale d'épidémiosurveillance en santé animale (Plateforme ESA), Groupe investigation Fièvre Q. 2025. Protocole STATELCOX 2.0. Décembre 2025. https://plateforme-esa.fr/fr/statelcox2-evaluer-le-niveau-de-circulation-de-la-fievre-q

Since 2025, 3 ILPT reports are available online:

-Final Inter-laboratory proficiency testing programme report (FQELSE19): Q fever serology with serum by ELISA. HAL: https://hal.science/hal-05349536
-Final Inter-Laboratory Proficiency Testing Program Report (FQELSE23): Q fever serology on serum by ELISA. HAL: https://hal.science/anses-05126539
-Final Inter-Laboratory Proficiency Testing Program Report (FQPCRMV24): PCR detection/quantification of Coxiella burnetii for diagnosis of abortion in ruminants. HAL: https://hal.science/anses-05112766

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

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

Yes

a) Technical visit : 2

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	GERMANY	1
A	SPAIN	1

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO 17025	PDF	1_2249_Cofrac__Notification accréditation_2024.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
ELISA (ruminant serum)	COFRAC (FLEX 2)
Quantitative real time PCR (ruminant vaginal or placental swab)	COFRAC (FIX)

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

Yes

BSL-3 facilities and institutional biorisk management procedures in place.

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?

No

25. Did you organise or participate in inter-laboratory proficiency tests with WOAH Reference Laboratories designated for the same pathogen during the past 2 years?

No

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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 during the past 2 years?

Yes

Purpose for inter-laboratory test comparisons1	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Name of the test	WOAH Member Countries
PCR methods (vaginal suspension)	Organizer	50	Commercial kits validated according French scope	AUSTRIA, BELGIUM, CROATIA, DENMARK, FINLAND, FRANCE, GERMANY, IRELAND, POLAND, ROMANIA, SERBIA, SWITZERLAND, UNITED KINGDOM,
Serology methods (serum)	Participant (Organizer = NRL Sciensano – Infectious Diseases in Animals)	7	ELISA Commercial kit (Cofrac accredited)	BELGIUM,

TOR12: EXPERT CONSULTANTS

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

No

29. Additional comments regarding your report:

Yes

Strain-focused work is essential to improve understanding, surveillance and preventive management of Q fever. The European project Q-Net-Assess supports workflow harmonisation from sampling to strain characterisation and metadata sharing (https://q-net-assess.com/).
A major bottleneck remains the high cost and administrative burden associated with UN 2814 shipments, which slows down compliant exchanges between laboratories. Targeted facilitation or guidance on compliant transport could significantly accelerate progress and international collaboration.

Surveillance would benefit from pragmatic harmonisation, including shared herd-level case definitions for ruminant holdings and minimum surveillance standards to improve international comparability.
To further strengthen representativeness and transdisciplinarity, WOAH could consider appointing additional experts within a network of WOAH Reference Laboratories, noting that the current number is limited.