World Organisation for Animal Health

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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:**	Rabbit haemorrhagic disease
***Address of laboratory:**	Via Antonio Bianchi 7/9, 25124 Brescia (Italy)
***Tel:**	+390302290388
***E-mail address:**	patrizia.cavadini@izsler.it
Website:	https://www.izsler.it/chi-siamo/per-chi-e-con-chi-lavoriamo/centri-direferenza/ internazionali/oie-reference-laboratory-for-rabbit-haemorrhagic-disease/
***Name (including Title) of Head of Laboratory (Responsible Official):**	Dr. Giorgio Varisco (DVM, General Director of IZSLER)
***Name (including Title and Position) of WOAH Reference Expert:**	Dr. Patrizia Cavadini (PhD)
***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
RHDV Competition ELISA	Yes	155	41
RHDV2 Competition ELISA	Yes	356	365
EBHSV Competition ELISA	Yes	421	0
RHDV IgG Isotype ELISA	Yes	22	31
RHDV IgM Isotype ELISA	Yes	2	1
RHDV IgA Isotype ELISA	Yes	2	1
Direct diagnostic tests		Nationally	Internationally
RT-PCR EBHSV	Yes	30	0
Genome sequencing	No	9	0
RT-PCR RHDV/RHDV2	Yes	2	0
RHDVs/EBHSV Sandwich ELISA	Yes	321	0
RHDVs Sandwich ELISA	Yes	65	0
EBHSV Sandwich ELISA	Yes	94	0

RT-PCR lagovirus	Yes	61	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
RHDV serological kit	cELISA	Produced	0	7 kits	3	CANADA, POLAND, UNITED STATES OF AMERICA,
EBHSV serological kit	cELISA	Produced	1kit	2kits	1	POLAND,
RHDV2 serological kit	cELISA	Produced	0	11kits	5	CANADA, FRANCE, POLAND, SPAIN, UNITED STATES OF AMERICA,
RHDV/RHDV2 Differential kit	MAbs sandwich ELISA	Produced	0	2	1	POLAND,
RHDV/EBHSV virological ki	MAbs sandwich ELISA	Produced	12kits	7kits	2	GERMANY, UNITED STATES OF AMERICA,

4. Did your laboratory produce vaccines?

Yes

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?

No

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?

No

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

No

TOR4: DIAGNOSTIC TESTING FACILITIES

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

Yes

Name of WOAH Member Country seeking assistance	Date	Which diagnostic test used	No. samples received for provision of diagnostic support	No. samples received for provision of confirmatory diagnoses
SPAIN	2025-06-09	cELISA RHDV2	127	0
HONG KONG	2025-03-21	cELISA RHDV, cELISA RHDV2, ELISA IgG RHDV, ELISA IgA RHDV, ELISA IgM RHDV	1	0
UNITED STATES OF AMERICA	2025-10-06	cELISA RHDV, cELISA RHDV2	36	0
THE NETHERLANDS	2025-12-22	cELISA RHDV2, ELISA IgG RHDV	21	0
SWEDEN	2025-05-22	cELISA RHDV, cELISA RHDV2, ELISA IgG RHDV	4	0
HUNGARY	2025-07-28	cELISA RHDV2	176	0

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
CHINA (PEOPLE'S REP. OF)	PROCEDURES FOR WORKING WITH RABBIT HAEMORRHAGIC DISEASE VIRUS (RHDV) AND OTHER LAGOVIRUSES	Emails
SINGAPORE	Protocols for molecular testing for RHDVs	Emails

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
European partnership on animal health and welfare (EUPAHW)	3 years	SOA12: BETO - Better tools for diagnosis of infectious diseases. Task 2: Faster, closer and across: Tools for early and rapid detection, as well as screening and monitoring	ANSES, CIRAD, CSIC, DEFR, DTU, EULS, FLI, INIAV, INRAE, ISS, IZSLER, IZSLT, IZS-Teramo, NVI, PIWET, RIVM, Ruokavirasto, Sciensano, SLA , SLU, SSI, SURREY, SVA , UAB, UCPH, UGent, UNIPD, UNITO, WR	BELGIUM DENMARK ESTONIA FINLAND FRANCE GEORGIA GERMANY ITALY NORWAY POLAND PORTUGAL SPAIN THE NETHERLANDS UNITED KINGDOM
Scientific collaboration aimed at a PhD thesis by an Algerian student.	2 years	Diagnosis of lagomorph diseases, with particular emphasis on viral diseases.	ENSV (Alger)	ALGERIA
JOINT LABORATORY ON RABBIT HEMORRHAGIC DISEASE	Not defined	Promote the cooperation of Joint Laboratory on genetic and antigenic variability and evolutionary trends of Rabbit hemorrhagic disease viruses: basis for the development of improved diagnostic methods and new subunit vaccines	JIANGSU ACADEMY OF AGRICULTURAL SCIENCES (JAAS)	CHINA (PEOPLE'S REP. OF)

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

No

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:
We examine the genomic and antigenic features of the various pathogenic and non-pathogenic lagovirus strains detected in rabbits, hares, and cottontails, mainly in European countries but also in other regions worldwide. These studies aim to gather information on the presence and distribution of lagovirus strains infecting lagomorph species, either as primary target hosts or as spillover hosts.

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:
Epidemiological data obtained from the examination of samples received from member countries are usually organized and elaborated in communications at meetings and conferences and for the preparation of scientific papers. Moreover, involvement in international projects and well-established collaborations, often including the exchange of reagents and materials, facilitates the collection and sharing of data and knowledge.

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:

5

1. Maziz-Bettahar S, Sahraoui L, Lahouassa H, Ainbaziz H, Cavadini P, Lavazza A, Capucci L. Serological data indicate a widespread presence of rabbit haemorrhagic disease in rabbit farms in Algeria. Sci Rep. 2025 Apr 4;15(1):11644. doi: 10.1038/s41598-025-95945-4. PMID: 40185862; PMCID: PMC11971301.

2. Estruch J, Cavadini P, Lavazza A, Capucci L, Abrantes J, Lopes AM, Almeida T, Neimanis A, Lavín S, Rouco C, Serrano E, Velarde R. Pathological and serological insights into Lagovirus diseases dynamics in the European brown hare (Lepus europaeus): A nine-year longitudinal study. Vet Microbiol. 2025 May; 304:110478. doi: 10.1016/j.vetmic.2025.110478. Epub 2025 Mar 22. PMID: 40158484.

3. Hu B, Dong W, Song Y, Fan Z, Cavadini P, and Wang F. Detection of a New Recombinant Rabbit Hemorrhagic Disease Virus 2 in China and Development of Virus-like Particle-Based Vaccine.Viruses 2025, 17, 710. doi.org/10.3390/v17050710

4. Severi G., Anzalone L., Madeo L., Serroni A., Colabella C., Di Paolo A., Mangili P.M., Manuali E., Felici A., Cagiola M., Lavazza A., Capucci L., Pezzotti G., De Giuseppe A.. Virus-like particles produced in the baculovirus system protect hares from European Brown Hare Syndrome virus (EBHSV) infection. Vaccines 2025, 13, 731 https://doi.org/10.3390/vaccines13070731

5. Duff P., Everest D., Martindale L., Barlow A., Rocchi M., Lavazza A. European brown hare syndrome virus and other lagoviruses of interest Veterinary Record 2024 Vol. 195 Issue 9 Pages 369-370 https://bvajournals.onlinelibrary.wiley.com/doi/abs/10.1002/vetr.4874

b) International conferences:

2

1. 13th International Congress for Veterinary Virology - Including an EPIZONE Session (ESVV 2025). Di Giovanni Vittoria, Cavalera Simone, Anfossi Laura, Cavadini Patrizia. Development of a lateral flow device (LFD) to detect EBHSV and RHDV2. Grand Hotel Bernardin, Portoroz (Slovenia), 2-5 Settembre 2025.

2. 13th International Congress for Veterinary Virology - Including an EPIZONE Session (ESVV 2025). Cappai Stefano, Muroni Gaia, Loi Federica, Puggioni Giantonella, Lavazza Antonio, Cavadini Patrizia, Mulas Daniela, Secci Fabio. Mapping and managing lagovirus impact: a data-driven strategy for wild rabbit and hare recovery in Sardinia. Grand Hotel Bernardin, Portoroz (Slovenia), 2-5 Settembre 2025.

c) National conferences:

2

1) Webinar organized by the National Reference Center entitled: "UPDATES ON VIRAL DISEASES OF LAGOMORPHS" 02/12/2025.
Speakers:

Diagnosis of viral diseases in rabbits: state of the art and performance evaluation, including non-conventional matrices (Patrizia Cavadini)

Presence and characterization of RHDVa strains in Italy over the last decade (Vittoria Di Giovanni)

Genomic characterization of myxomatosis viruses, with particular reference to the Borghi vaccine strain and to strains identified in hares (Moira Bazzucchi)

The ELISpot method for the diagnosis of cell-mediated immunity to myxomatosis: state of the art and prospects for use (Elisa Rossini)

Emerging diseases in wild lagomorphs: the case of syphilis (Tiziana Trogu)

Role and vector competence of insects in the transmission of RHDV and myxomatosis (Francesco Defilippo)

2) Italian Scientific Association of Rabbit Breeders (ASIC) Conference, Rimini, Italy, 8May 2025. Title: 13th WRC: Special correspondents in Tarragona. Speaker Vittoria Di Giovanni

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?

Yes

a) Technical visit : 1

b) Seminars : 5

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	CHINA (PEOPLE'S REP. OF)	20
B	CHINA (PEOPLE'S REP. OF)	20

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
UNI CEI ENISO/IEC 1702	PDF	CERTIFICATO-DI-ACCREDITAMENTO.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Serological Competitive RHDV2-ELISA	ILAC MRA , ACCREDIA
Electron Microscopy negative staining methods	ILAC MRA , ACCREDIA
Serological Competitive RHDV-ELISA	ILAC MRA , ACCREDIA
RT_PCR and Real Time RT-PCR	ILAC MRA , ACCREDIA
Virological sandwich MAbs RHDV/EBHSV-ELISA	ILAC MRA , ACCREDIA
Immunohistochemistry	ILAC MRA , ACCREDIA

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

Yes

The laboratory works according to the Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, Chapter 1.1.4, and the WOAH Laboratory Biosafety Manual. A risk analysis approach was adopted to manage the biological risks of specific agents aimed at biosecurity in veterinary laboratories and animal facilities. As a result of this process, the assignment of RHDV to the risk group (BLS2) relevant to the country was defined, and the consequent steps were taken to work in laboratory facilities defined by containment levels appropriate to the types of risks identified.

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?

Not applicable (only WOAH Reference Laboratory designated for the disease

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

Not applicable (only WOAH Reference Laboratory designated for the disease

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?

Not applicable (Only WOAH Reference Laboratory designated for the disease)

not applicable

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?

Not applicable (only WOAH Reference Laboratory designated for the disease

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
We prepared and distributed a panel of positive samples (antigen positive extracts) to be used by recipients for the validation of their analytical performances	Organizer	1	ELISA and RT-qPCR	UNITED STATES OF AMERICA,

TOR12: EXPERT CONSULTANTS

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

Yes

Kind of consultancy	Location	Subject (facultative)
Last review of the the Chapter of the Manual was completed on 2022 and approved and published on 2023.	On site, by email	We changed Table 1 to make it coherent with the "RHD case definition". Then we included some other changes in the chapter originating from the latest data and information from scientific literature, i.e., species susceptibility to RHD/RHDV2 and new biotechnological vaccines.

29. Additional comments regarding your report:

Yes

During 2025 the laboratory has applied both nationally and internationally the specific direct and indirect tests (MAbsELISA and RT PCR for antigen detection, cELISA and isotype_ELISAs for antibody detection) specifically developed for RHDV2.

Following the epidemic occurrence of RHDV2 in North and Central America, we continued to collaborate and support American colleagues in the detection of the virus in wild and domestic lagomorphs.

Even more information on pathogenic and non-pathogenic lagoviruses' spread, host susceptibility, and antigenic and genomic characteristics was acquired thanks to the scientific collaboration and research projects with colleagues from various member Countries.

Technical support, including training and visiting periods, was given to different WOAH member countries, mainly on diagnostic activity and the provision of reagents and materials.