**WOAH Reference Laboratory Reports Activities 2023**

**Activities in 2023**

This report has been submitted: 10 juin 2024 12:16

### Laboratory Information

| Name of disease (or topic) for which you are a designated WOAH Reference Laboratory: | Marek’s disease |
| Address of laboratory: | Ash Road, Pirbright, Woking, Surrey, GU24 0NF UNITED KINGDOM |
| Tel.: | +441483231493 |
| E-mail address: | yongxiu.yao@pirbright.ac.uk |
| Website: | https://www.pirbright.ac.uk/diagnostics-surveillance/mareks-disease-virus-referencelaboratory |

| Name (including Title) of Head of Laboratory (Responsible Official): | Dr. Yongxiu Yao |
| Name (including Title and Position) of WOAH Reference Expert: | Dr. Yongxiu Yao, Head of viral Oncogenesis group |

Which of the following defines your laboratory? Check all that apply:

- Academic institution

### 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)

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Indicated in WOAH Manual (Yes/No)</th>
<th>Total number of test performed last year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect diagnostic tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Nationally</td>
<td>Internationally</td>
</tr>
<tr>
<td>Direct diagnostic tests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real-time PCR for virulent MDV-1, MDV-2, HVT vaccine, CVI988 vaccine, and Prevexion vaccine</td>
<td>Yes</td>
<td>3662 N 193 I</td>
</tr>
<tr>
<td>Vaccine virus titration by virus isolation</td>
<td>Yes</td>
<td>3 N 0 I</td>
</tr>
<tr>
<td>Field virus isolation</td>
<td>Yes</td>
<td>8 N 0 I</td>
</tr>
</tbody>
</table>

### 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?

No

4. Did your laboratory produce vaccines?

Not applicable
5. Did your laboratory supply vaccines to WOAH Members?
   Not applicable

**TOR3: NEW PROCEDURES**

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

<table>
<thead>
<tr>
<th>NAME OF THE NEW TEST OR DIAGNOSTIC METHOD DEVELOPED</th>
<th>DESCRIPTION AND REFERENCES (PUBLICATION, WEBSITE, ETC.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real-time PCR for specific detection of the new Marek's disease vaccine ‘Preveoxion-RN®’</td>
<td>Validation of this test as an ISO/IEC 17025-accredited test is in progress; the report (when completed) could be requested from: Marek's Disease Virus Reference Laboratory, The Pirbright Institute, Ash Road, Woking, Surrey, GU24 0NF, UK (<a href="https://www.pirbright.ac.uk/diagnostics-surveillance/mareks-disease-virus-reference-laboratory">https://www.pirbright.ac.uk/diagnostics-surveillance/mareks-disease-virus-reference-laboratory</a>)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>NAME OF WOAH MEMBER COUNTRY SEEKING ASSISTANCE</th>
<th>DATE</th>
<th>WHICH DIAGNOSTIC TEST USED</th>
<th>NO. SAMPLES RECEIVED FOR PROVISION OF DIAGNOSTIC SUPPORT</th>
<th>NO. SAMPLES RECEIVED FOR PROVISION OF CONFIRMATORY DIAGNOSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>BELGIUM</td>
<td>2023-11-01</td>
<td>Real-time PCR for CVI988 vaccine</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>IRELAND</td>
<td>2023-01-02</td>
<td>Real-time PCR for CVI988 vaccine and HVT vaccine</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>IRELAND</td>
<td>2023-02-01</td>
<td>Real-time PCR for CVI988 vaccine and HVT vaccine</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>IRELAND</td>
<td>2023-03-01</td>
<td>Real-time PCR for CVI988 vaccine and HVT vaccine</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>LIBYA</td>
<td>2023-11-01</td>
<td>Real-time PCR for vMDV and MDV-2</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>RUSSIA</td>
<td>2023-06-01</td>
<td>Real-time PCR for vMDV and MDV-2, and for CVI988 vaccine</td>
<td>33</td>
<td>33</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>NAME OF THE WOAH MEMBER COUNTRY RECEIVING A TECHNICAL CONSULTANCY</th>
<th>PURPOSE</th>
<th>HOW THE ADVICE WAS PROVIDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAUDI ARABIA</td>
<td>To provide advice on collection of field samples, sample processing, and real-time PCR set-up for detecting vMDV and vaccine strains</td>
<td>In-person meeting with Khaled Hussein (Almarai Co.); electronic copies of guidance documents provided</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Title of the study</th>
<th>Duration</th>
<th>PURPOSE OF THE STUDY</th>
<th>PARTNERS (INSTITUTIONS)</th>
<th>WOAH MEMBER COUNTRIES INVOLVED OTHER THAN YOUR COUNTRY</th>
</tr>
</thead>
<tbody>
<tr>
<td>The consequences of transmissible vaccines on disease ecology and pathogen evolution</td>
<td>5 years</td>
<td>To use a Marek's disease virus vaccine-challenge model to understand the impact of transmissible vaccines</td>
<td>Pennsylvania State University</td>
<td>UNITED STATES OF AMERICA</td>
</tr>
</tbody>
</table>
**Marek’s disease virus as a case study**

- Examine the molecular diversity of MDV field isolates
  - 5 years
  - Examining the molecular diversity of MDV field isolates
  - Henan academy of Agricultural Science
  - CHINA (PEOPLE’S REP. OF)

- Exploring the potential of MDV-2 as a vaccine vector
  - 4 years
  - To test if MDV-2 is a good candidate for vectored vaccines against MD and other avian viral diseases
  - MSD Animal Health
  - THE NETHERLANDS

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 have an ongoing project to sequence the meq gene (closely linked to virulence of Marek’s disease virus) of MDV isolated from samples submitted from UK backyard chicken flocks, to investigate the phylogeny, pathology, and distribution of these viruses, and the potential threat to commercial poultry.

15. Did your laboratory disseminate epidemiological data that had been processed and analysed?
No

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:

4


b) International conferences:

14

Professor Venugopal Nair has given the following talks:

1. Invited to talk on Avian Oncogenic viral diseases: A major concern for livestock farming & welfare’ at the 15th Kerala Veterinary Science Congress at Kerala Veterinary & Animal Sciences University Pookode, Kerala, India on 18th November 2023.
2. Invited speaker to talk on ‘Marek’s Disease: A major challenge for Poultry Health & an excellent model for viral oncogenesis on 2nd Nov 2023 at the 12th Asia Pacific Poultry Conference (APPC2023) Nanjing.
5. V Nair talked on ‘Innovations in control strategies of Avian diseases’ at the College of Veterinary Medicine, South China Agricultural University, Guangzhou, China on 8...
Nov 2023 at the inauguration of the CERAD Guangzhou Unit.
6. V Nair talked on ‘Recent advances in the pathogenesis and control of avian oncogenic viral diseases’ at the College of Veterinary Medicine, Nanjing Agricultural University on 1st November 2023.

Dr. Yongxiu Yao has given the following talks:
1. Talk at the inauguration of the UK-China CERAD Guangzhou Unit in South China Agricultural University, China, 8th November 2023. Title: Genome editing of avian herpesviruses for recombinant vaccine development.
2. Talk at “Sino-European Modern Livestock & Poultry Industry Technology Innovation Seminar & the Launch of the Joint Laboratory of China & European Countries” in Binzhou, China, 4-8th November 2023. Title: Genome editing of avian herpesviruses for recombinant vaccine development.
3. Talk at the 12th Asia Pacific Poultry Conference (APPC2023)’ Nanjing, China, 1st Nov 2023. Title: Genome editing of avian herpesviruses for recombinant vaccine development.
4. Talk at the college of Veterinary Medicine, Nanjing Agricultural University, China, 1st November 2023. Title: Genome editing of avian herpesviruses for recombinant vaccine development.
5. Talk at "International Symposium on Important Animal Diseases and Zoonoses" in Yangzhou University, China, 31st October 2023. Title: Genome editing of avian herpesviruses for recombinant vaccine development.
6. Talk at the GARAD Conference Guildford 22-24 May 2023. Title: Genome editing of avian herpesviruses for recombinant vaccine development.
7. Invited virtual talk at “The 2nd international academic forum on animal farming health” in Shenyang Agricultural University, China, 14th October 2023. Title: CRISPR/Cas9 Powerful tool to study virus-host interaction and vaccine development.

c) National conferences:
0

Haven’t attended any national conferences in 2023.

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: 0
b) Seminars: 2
c) Hands-on training courses: 0
d) Internships (>1 month): 0

<table>
<thead>
<tr>
<th>Type of technical training provided (a, b, c or d)</th>
<th>Country of origin of the expert(s) provided with training</th>
<th>No. participants from the corresponding country</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>THE NETHERLANDS</td>
<td>10</td>
</tr>
</tbody>
</table>

TOR8: QUALITY ASSURANCE

18. Does your laboratory have a Quality Management System?

Yes

<table>
<thead>
<tr>
<th>Quality management system adopted</th>
<th>Certificate scan (PDF, JPG, PNG format)</th>
<th>Accreditation body</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO/IEC 17025:2017</td>
<td>Certificate issued by UK accreditation service</td>
<td>United Kingdom Accreditation Service (UKAS) 17025</td>
</tr>
</tbody>
</table>

19. Is your quality management system accredited?

Yes

<table>
<thead>
<tr>
<th>Test for which your laboratory is accredited</th>
<th>Accreditation body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real-time PCR testing of chicken organs, feathers, and poultry dust to detect Marek’s disease virus (vMDV), MDV-2, and vaccine strains CVI988 and HVT</td>
<td>United Kingdom Accreditation Service (UKAS) 17025</td>
</tr>
</tbody>
</table>

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

Yes

MDV (including MDV serotypes 1, 2 and HVT) causes diseases in poultry species such as chickens, turkey and quails. The viruses are exclusive pathogens of avian species
and hence are unlikely to infect and cause any harm to the human. Also, no known risks to the environment have been associated with these viruses. However, sample preparation for qPCR and when the culture of the virus is involved, strictly all of the work will be performed with the appropriate PPE (nitrile gloves and lab coat); and in containment level 2 environment solely for sample protection, and for sterility of cultures in line with group practices for culture of avian herpesviruses.

**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. Do you network (collaborate or share information) with other 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?
Not applicable (Only WOAH Reference Laboratory designated for the disease)

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?
No

**TOR12: EXPERT CONSULTANTS**

28. Did your laboratory place expert consultants at the disposal of WOAH?
No

29. Additional comments regarding your report:
Yes

Unlike high consequential animal diseases with epidemic/pandemic potential, Marek's disease is endemic in most member countries. As it is not a notifiable disease in these countries, testing the samples for diagnosis may be seen as less of a priority and hence large numbers of samples are not submitted to the MDVRL from many countries. However, MDVRL activities increased significantly during 2023, specifically sample submissions as evidenced by 932 samples in 2022 to 3855 samples in 2023, as well as vaccine titration and field virus isolation. In addition, we worked on developing and validating a real-time PCR specific for Prevexxion vaccine as an ISO/IEC 17025 accredited test. We continue to provide technical advice to queries, diagnostic support and confirmation diagnoses from other member countries, and supply standard reference reagents upon request. Other activities include collecting epidemiological data relevant to international disease control, participation of international scientific studies in collaboration with WOAH members, and dissemination of information by publishing in peer-reviewed journals and presenting at international meetings. Most of the activities are carried out using the funding from the Pirbright Institute MDVRL or from charges for the tests, as we do not receive any funding support from the WOAH or local government.

MDVRL is open to receive requests to deliver hands-on training to other members but has not yet been successful on this. We planned to provide the training to Zoetis representatives from Saudi Arabia in 2023, but the planned training had to be cancelled twice because the attendees were unable to get visas. Additionally, we have been working with Pirbright Training Team to prepare training modules which can be used to achieve this goal, funding permitted. Furthermore, although there has been no successful in-person training conducted, we have been actively providing technical advice to queries from many member countries on MD testing and disease control by emails, video calls and during our visits to other countries.

MDVRL at Pirbright is the only accredited MDV reference laboratory, there is no other MDV ref lab to network with for inter-laboratory proficiency testing. Currently, there are no other laboratories that routinely use the same real-time PCR tests for diagnostic testing of MDV. As part of the ongoing discussion on this topic with our accreditation body, we test samples for a previous collaborator of known provenance. We have offered support to another laboratory which, after completing the due diligences, could be considered to partake in interlaboratory comparision testing. This other laboratory is not yet fully implemented and their methodology not fully validated.