This report has been submitted: 2018-01-11 14:54:11

| Name of disease (or topic) for which you are a designated OIE Reference Laboratory: | Escherichia coli |
| Address of laboratory: | 3200 Sicotte Saint-Hyacinthe Québec J2S 2M2 CANADA |
| Tel.: | +1-450 773.85.21 |
| Fax: | +1-450 778.81.08 |
| E-mail address: | john.morris.fairbrother@umontreal.ca |
| Website: | www.ecl-lab.ca; www.apzec.ca |
| Name (including Title) of Head of Laboratory (Responsible Official): | John Morris Fairbrother, BVsc, PhD, Professor |
| Name (including Title and Position) of OIE Reference Expert: | John Morris Fairbrother, BVsc, PhD, Professor |
| Which of the following defines your laboratory? Check all that apply: | Academic |
**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

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Indicated in OIE Manual (Yes/No)</th>
<th>Total number of test performed last year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nationally</td>
<td>Internationally</td>
</tr>
<tr>
<td><strong>Indirect diagnostic tests</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slide agglutination E. coli O serotyping</td>
<td>Yes</td>
<td>71</td>
</tr>
<tr>
<td>Conventional PCR for pathogenic E. coli (up to 10 virulence genes)</td>
<td>Yes</td>
<td>10401</td>
</tr>
<tr>
<td>Antimicrobial resistance by minimal inhibition concentration, disk diffusion, PCR or gene sequencing</td>
<td>Yes</td>
<td>405</td>
</tr>
<tr>
<td><strong>Direct diagnostic tests</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse-field gel electrophoresis</td>
<td>No</td>
<td>200</td>
</tr>
<tr>
<td>Whole genome sequencing</td>
<td>Yes</td>
<td>48</td>
</tr>
</tbody>
</table>

**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
<table>
<thead>
<tr>
<th>Type of reagent available</th>
<th>Related diagnostic test</th>
<th>Produced/ provide</th>
<th>Amount supplied nationally (ml, mg)</th>
<th>Amount supplied internationally (ml, mg)</th>
<th>No. of recipient OIE Member Countries</th>
<th>Region of recipients</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. coli reference strains</td>
<td>Conventional PCR for pathogenic E. coli</td>
<td>produced and provided</td>
<td>17 strains</td>
<td>5 strains</td>
<td>3</td>
<td>Africa, Americas, Asia and Pacific, Europe, Middle East</td>
</tr>
<tr>
<td>F4 (K88) antiserum</td>
<td>Slide agglutination E. coli O serotyping</td>
<td>produced and provided</td>
<td>60 ml</td>
<td>0 ml</td>
<td>1</td>
<td>Africa, Americas, Asia and Pacific, Europe, Middle East</td>
</tr>
<tr>
<td>F5 (K99) antiserum</td>
<td>Slide agglutination E. coli O serotyping</td>
<td>produced and provided</td>
<td>57 ml</td>
<td>0 ml</td>
<td>1</td>
<td>Africa, Americas, Asia and Pacific, Europe, Middle East</td>
</tr>
<tr>
<td>anti-O2 antiserum</td>
<td>Slide agglutination E. coli O serotyping</td>
<td>produced and provided</td>
<td>1 ml</td>
<td>0 ml</td>
<td>1</td>
<td>Africa, Americas, Asia and Pacific, Europe, Middle East</td>
</tr>
<tr>
<td>anti-O157 antiserum</td>
<td>Slide agglutination E. coli O serotyping</td>
<td>produced and provided</td>
<td>2 ml</td>
<td>0 ml</td>
<td>1</td>
<td>Africa, Americas, Asia and Pacific, Europe, Middle East</td>
</tr>
</tbody>
</table>

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?

Yes

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

No

<table>
<thead>
<tr>
<th>Name of the new test or diagnostic method or vaccine developed</th>
<th>Description and References (Publication, website, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole genome sequencing (WGS) of E. coli isolates</td>
<td>We are developing WGS of E. coli isolates for serotyping, MLST and detection of virulence and antimicrobial resistance genes using Illumina Nextera XT library preparation kit (<a href="https://www.illumina.com/products/by-type/sequencing-kits/library-prep-kits/nextera-xt-dna.html">https://www.illumina.com/products/by-type/sequencing-kits/library-prep-kits/nextera-xt-dna.html</a>) and an Illumina MiSeq sequencing platform (<a href="https://www.illumina.com/systems/sequencing-platforms/miseq.html">https://www.illumina.com/systems/sequencing-platforms/miseq.html</a>) and in silico analysis.</td>
</tr>
</tbody>
</table>

**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
<table>
<thead>
<tr>
<th>Title of the study</th>
<th>Duration</th>
<th>Purpose of the study</th>
<th>Partners (Institutions)</th>
<th>OIE Member Countries involved other than your country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detection, prevalence and antimicrobial resistance of potentially zoonotic pathogenic Escherichia coli in the dromedary and other production species in Tunisia</td>
<td>3 years</td>
<td>To study the epidemiology of neonatal diarrhea caused by E.coli in camels in Tunisia and to examine the prevalence of virulence genes and antimicrobial resistance of E.coli isolated on different species in animal production</td>
<td>Institut des Régions Arides (IRA), Ministère de l’Agriculture, Tunisia</td>
<td>TUNISIA</td>
</tr>
<tr>
<td>Identification of potentially pathogenic E. coli and their antimicrobial resistance from chickens on farm and at slaughter in Senegal</td>
<td>3 years</td>
<td>Characterization of virotype, serotype, phylotype, and antimicrobial resistance of E. coli isolates</td>
<td>École Inter-États des Sciences et Médecine Vétérinaires (EISMV), Senegal</td>
<td>SENEGAL</td>
</tr>
<tr>
<td>Study of different points of the production chain of cheeses made from unpasteurized milk in Brazil as sources of E. coli to the final product</td>
<td>2 years</td>
<td>To identify the contamination of E. coli in raw cheese and identify if they can be a risk to public health in Brazil</td>
<td>Faculty of Agriculture and Veterinary Sciences, São Paulo State University (UNESP), Jaboticabal, Brazil</td>
<td>BRAZIL</td>
</tr>
<tr>
<td>Study of the prevalence of bioresistances in the equine healthy population in France. (Antimicrobial resistance in Enterobacteriaceae)</td>
<td>2 years</td>
<td>To study the epidemiology of antimicrobial resistance in the healthy equine population in France, and to characterize the commensal E. coli producing BLSE/AmpC in this population.</td>
<td>INRA Tours, France</td>
<td>FRANCE</td>
</tr>
</tbody>
</table>

**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

12. Did your laboratory disseminate epizootiological data that had been processed and analysed?

Yes

13. What method of dissemination of information is most often used by your laboratory? (Indicate in the appropriate box the number by category)
Escherichia coli - John Morris Fairbrother - canada

a) Articles published in peer-reviewed journals: 7


b) International conferences: 4


d) National conferences: 7


d) National conferences: 7


d) Other:
(Provide website address or link to appropriate information)  6
www.ecl-lab.ca/en (Our window for dissemination of information on our OIE related activities.)
www.apzec.ca (Our online database.)
https://www.facebook.com/OIE-Reference-Laboratory-for-Escherichia-coli-230085313706655/

Book chapter

Reports


Invited speaker

Fairbrother J.M. Pathogenic Escherichia coli in pigs: current challenges with multidrug resistance. Shur-Gain/Nutreco Canada, Guelph, ON Canada, November 29th 2017

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:  0
b) Seminars:  0
  c) Hands-on training courses:  0
d) Internships (>1 month):  2
<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>d</td>
<td>France</td>
<td>1</td>
</tr>
<tr>
<td>d</td>
<td>Senegal</td>
<td>1</td>
</tr>
</tbody>
</table>

**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 certified according to an International Standard?  
Yes

<table>
<thead>
<tr>
<th>Quality management system adopted</th>
<th>Certificate scan (PDF, JPG, PNG format)</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Association of Veterinary Laboratory Diagnosticians (AAVLD)</td>
<td>2016 AAVLD Certificate U of Montreal.pdf</td>
</tr>
</tbody>
</table>

16. Is your laboratory accredited by an international accreditation body?  
Yes

<table>
<thead>
<tr>
<th>Test for which your laboratory is accredited</th>
<th>Accreditation body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please see: <a href="http://www.aavld.org/accreditation-requirements-page">http://www.aavld.org/accreditation-requirements-page</a></td>
<td>American Association of Veterinary Laboratory Diagnosticians (AAVLD)</td>
</tr>
</tbody>
</table>

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?

Not applicable (Only OIE Reference Lab. designated for disease)

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?

Not applicable (Only OIE Reference Lab. designated for disease)

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?

Not applicable (Only OIE Reference Lab. designated for disease)

**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?

No

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

**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?

No

25. Additional comments regarding your report:

1) Because the External Quality Assessment Scheme for Shiga Toxin/Vero Cytotoxin-Producing Escherichia coli (STEC/VTEC) & other Diarrhoeagenic E. coli (DEC) (Typing verotoxinogenic E. coli to determine laboratory capability to subtype verotoxins, carry out O serotyping and PCR to detect virulence genes) organized by the World Health Organization Collaborating Centre (WHO CC) for Reference and Research on Escherichia and Klebsiella at Statens Serum Institut (SSI) was temporarily unavailable for 2017, we submitted E. coli strains to the
E. coli Reference Center-PennState University to compare our results for O serotyping with theirs. We are participating in the next External Quality Assessment Scheme for Shiga Toxin/Vero Cytotoxin-Producing Escherichia coli (STEC/VTEC) & other Diarrhoeagenic E. coli (DEC) which will be held in 2018.

2) We are planning to participate in the next GMI (Global Microbial Identifier) Proficiency Test in 2018 to compare our WGS results with those from other laboratories. Please see: http://www.globalmicrobialidentifier.org/news-and-events/nyheder/Nyhed?id={917AEA21-9C8E-4BB9-97D1-0954C6140D84}

3) In March 2017, following our submission to OIE of a detailed description of our Quality Management System (AAVLD accreditation program), the OIE Commission concurred with the conclusion of the submitted White Paper that the AAVLD program is 96% equivalent to ISO 17025 and agreed to maintain our OIE Reference Laboratory designation (OIE ref: SL/SL 35.433).

4) We will submit by the end of February 2018 an updated version of the chapter on Verocytotoxogenic Escherichia coli for the OIE Terrestrial Manual: Chapter on Verocytotoxogenic Escherichia coli.