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Modelling the transmission dynamics of *Campylobacter* in Ontario, Canada, assuming house flies, *Musca domestica*, are a mechanical vector of disease transmission

Melanie Cousins, Jan M. Sargeant, David Fisman and Amy L. Greer

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Review timeline

Original submission:	22 August 2018
Revised submission:	11 January 2019
Final acceptance:	14 January 2019

Note: Reports are unedited and appear as submitted by the referee. The review history appears in chronological order.

Note: This manuscript was transferred from another Royal Society journal without peer review.

Review History

RSOS-181394.R0 (Original submission)

Review form: Reviewer 1

Is the manuscript scientifically sound in its present form?
Yes

Are the interpretations and conclusions justified by the results?
Yes

Is the language acceptable?
Yes

Is it clear how to access all supporting data?
No

Do you have any ethical concerns with this paper?
No

Have you any concerns about statistical analyses in this paper?
I do not feel qualified to assess the statistics

Recommendation?
Accept with minor revision (please list in comments)

Comments to the Author(s)
This study aimed to determine if a basic SIR compartment model that included flies as a mechanical vector and incorporated a seasonally forced environment compartment could be used to capture the observed disease dynamics of Campylobacter in Ontario, Canada.

The model was calibrated using one season's public health surveillance data on campylobacteriosis incidence, and validated using multi-season data on campylobacteriosis incidence. The validated model was used to determine potential changes to campylobacteriosis incidence using predicted changes to fly population size and fly activity under multiple climate change scenarios.

This is a very careful mathematical modeling study. The analysis convincingly supports the conclusions.

The reviewer would like to point out one limitation on the modeling study, regarding model validation. The model, as described on page 25, has three kinds of hosts, human, flies, and environment (B). The surveillance data used for fitting and validation is only for human hosts; there is no independent data for flies or the environment to validate these two parts of the model. While it is reality that no such data exists, it is a limitation on the modeling study. The reviewer would like to see this limitation discussed in the discussion, so that other readers can be aware of it.

Decision letter (RSOS-181394.R0)

04-Jan-2019

Dear Professor Cousins

On behalf of the Editors, I am pleased to inform you that your Manuscript RSOS-181394 entitled "Modelling the transmission dynamics of Campylobacter in Ontario, Canada assuming house flies, Musca domestica, are a mechanical vector of disease tran" has been accepted for publication in Royal Society Open Science subject to minor revision in accordance with the referee suggestions. Please find the referees' comments at the end of this email.

The reviewers and handling editors have recommended publication, but also suggest some minor revisions to your manuscript. Therefore, I invite you to respond to the comments and revise your manuscript.

• Ethics statement
If your study uses humans or animals please include details of the ethical approval received, including the name of the committee that granted approval. For human studies please also detail

whether informed consent was obtained. For field studies on animals please include details of all permissions, licences and/or approvals granted to carry out the fieldwork.

• Data accessibility
It is a condition of publication that all supporting data are made available either as supplementary information or preferably in a suitable permanent repository. The data accessibility section should state where the article's supporting data can be accessed. This section should also include details, where possible of where to access other relevant research materials such as statistical tools, protocols, software etc can be accessed. If the data has been deposited in an external repository this section should list the database, accession number and link to the DOI for all data from the article that has been made publicly available. Data sets that have been deposited in an external repository and have a DOI should also be appropriately cited in the manuscript and included in the reference list.

If you wish to submit your supporting data or code to Dryad (http://datadryad.org/), or modify your current submission to dryad, please use the following link:
http://datadryad.org/submit?journalID=RSOS&manu=RSOS-181394

• Competing interests
Please declare any financial or non-financial competing interests, or state that you have no competing interests.

• Authors' contributions
All submissions, other than those with a single author, must include an Authors' Contributions section which individually lists the specific contribution of each author. The list of Authors should meet all of the following criteria; 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published.

All contributors who do not meet all of these criteria should be included in the acknowledgements.

We suggest the following format:
AB carried out the molecular lab work, participated in data analysis, carried out sequence alignments, participated in the design of the study and drafted the manuscript; CD carried out the statistical analyses; EF collected field data; GH conceived of the study, designed the study, coordinated the study and helped draft the manuscript. All authors gave final approval for publication.

• Acknowledgements
Please acknowledge anyone who contributed to the study but did not meet the authorship criteria.

• Funding statement
Please list the source of funding for each author.

Please note that we cannot publish your manuscript without these end statements included. We have included a screenshot example of the end statements for reference. If you feel that a given heading is not relevant to your paper, please nevertheless include the heading and explicitly state that it is not relevant to your work.

Because the schedule for publication is very tight, it is a condition of publication that you submit the revised version of your manuscript before 13-Jan-2019. Please note that the revision deadline

will expire at 00.00am on this date. If you do not think you will be able to meet this date please let me know immediately.

To revise your manuscript, log into https://mc.manuscriptcentral.com/rsos and enter your Author Centre, where you will find your manuscript title listed under "Manuscripts with Decisions". Under "Actions," click on "Create a Revision." You will be unable to make your revisions on the originally submitted version of the manuscript. Instead, revise your manuscript and upload a new version through your Author Centre.

When submitting your revised manuscript, you will be able to respond to the comments made by the referees and upload a file "Response to Referees" in "Section 6 - File Upload". You can use this to document any changes you make to the original manuscript. In order to expedite the processing of the revised manuscript, please be as specific as possible in your response to the referees. We strongly recommend uploading two versions of your revised manuscript:

1) Identifying all the changes that have been made (for instance, in coloured highlight, in bold text, or tracked changes);
2) A 'clean' version of the new manuscript that incorporates the changes made, but does not highlight them.

When uploading your revised files please make sure that you have:

1) A text file of the manuscript (tex, txt, rtf, docx or doc), references, tables (including captions) and figure captions. Do not upload a PDF as your "Main Document";
2) A separate electronic file of each figure (EPS or print-quality PDF preferred (either format should be produced directly from original creation package), or original software format);
3) Included a 100 word media summary of your paper when requested at submission. Please ensure you have entered correct contact details (email, institution and telephone) in your user account;
4) Included the raw data to support the claims made in your paper. You can either include your data as electronic supplementary material or upload to a repository and include the relevant doi within your manuscript. Make sure it is clear in your data accessibility statement how the data can be accessed;
5) All supplementary materials accompanying an accepted article will be treated as in their final form. Note that the Royal Society will neither edit nor typeset supplementary material and it will be hosted as provided. Please ensure that the supplementary material includes the paper details where possible (authors, article title, journal name).

Supplementary files will be published alongside the paper on the journal website and posted on the online figshare repository (https://rs.figshare.com/). The heading and legend provided for each supplementary file during the submission process will be used to create the figshare page, so please ensure these are accurate and informative so that your files can be found in searches. Files on figshare will be made available approximately one week before the accompanying article so that the supplementary material can be attributed a unique DOI.

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Royal Society Publishing. You can find out more about the charges at http://rsos.royalsocietypublishing.org/page/charges. Should you have any queries, please contact openscience@royalsociety.org.

Once again, thank you for submitting your manuscript to Royal Society Open Science and I look forward to receiving your revision. If you have any questions at all, please do not hesitate to get in touch.

Kind regards,
Royal Society Open Science Editorial Office
Royal Society Open Science
openscience@royalsociety.org

on behalf of Dr John Dalton (Associate Editor) and Kevin Padian (Subject Editor)
openscience@royalsociety.org

Associate Editor Comments to Author (Dr John Dalton):
Associate Editor: 1
Comments to the Author:
You paper has a been accepted. Please see minor suggestions by our reviewer to improve your manuscript.

Editor comments to author:

Sorry for the delay; we got only one reviewer and then a second, who is three months late, and inasmuch as the first reviewer suggests only minor revisions we do not want to hold you up longer. Thanks for your patience and we look forward to your revision.

Reviewer comments to Author:
Reviewer: 1

Comments to the Author(s)
This study aimed to determine if a basic SIR compartment model that included flies as a mechanical vector and incorporated a seasonally forced environment compartment could be used to capture the observed disease dynamics of Campylobacter in Ontario, Canada.

The model was calibrated using one season's public health surveillance data on campylobacteriosis incidence, and validated using multi-season data on campylobacteriosis incidence. The validated model was used to determine potential changes to campylobacteriosis incidence using predicted changes to fly population size and fly activity under multiple climate change scenarios.

This is a very careful mathematical modeling study. The analysis convincingly supports the conclusions.

The reviewer would like to point out one limitation on the modeling study, regarding model validation. The model, as described on page 25, has three kinds of hosts, human, flies, and environment (B). The surveillance data used for fitting and validation is only for human hosts; there is no independent data for flies or the environment to validate these two parts of the model. While it is reality that no such data exists, it is a limitation on the modeling study. The reviewer would like to see this limitation discussed in the discussion, so that other readers can be aware of it.

Author's Response to Decision Letter for (RSOS-181394.R0)

See Appendix A.

Decision letter (RSOS-181394.R1)

14-Jan-2019

Dear Professor Cousins,

I am pleased to inform you that your manuscript entitled "Modelling the transmission dynamics of Campylobacter in Ontario, Canada assuming Musca domestica are a mechanical vector of disease transmission." is now accepted for publication in Royal Society Open Science.

You can expect to receive a proof of your article in the near future. Please contact the editorial office (openscience_proofs@royalsociety.org and openscience@royalsociety.org) to let us know if you are likely to be away from e-mail contact. Due to rapid publication and an extremely tight schedule, if comments are not received, your paper may experience a delay in publication.

Royal Society Open Science operates under a continuous publication model (http://bit.ly/cpFAQ). Your article will be published straight into the next open issue and this will be the final version of the paper. As such, it can be cited immediately by other researchers. As the issue version of your paper will be the only version to be published I would advise you to check your proofs thoroughly as changes cannot be made once the paper is published.

On behalf of the Editors of Royal Society Open Science, we look forward to your continued contributions to the Journal.

Kind regards,
Royal Society Open Science Editorial Office
Royal Society Open Science
openscience@royalsociety.org

on behalf of Dr John Dalton (Associate Editor) and Professor Kevin Padian (Subject Editor)
openscience@royalsociety.org

Appendix A

Reviewer 1:

1. *This study aimed to determine if a basic SIR compartment model that included flies as a mechanical vector and incorporated a seasonally forced environment compartment could be used to capture the observed disease dynamics of Campylobacter in Ontario, Canada.*

   We appreciate that the aim of the study was clear.

2. *The model was calibrated using one season's public health surveillance data on campylobacteriosis incidence, and validated using multi-season data on campylobacteriosis incidence. The validated model was used to determine potential changes to campylobacteriosis incidence using predicted changes to fly population size and fly activity under multiple climate change scenarios.*

   We appreciate that the methods of model calibration and validation were clear.

3. *This is a very careful mathematical modeling study. The analysis convincingly supports the conclusions.*

   We gratefully thank the Reviewer for the review of this paper and are pleased with the feedback.

4. *The reviewer would like to point out one limitation on the modeling study, regarding model validation. The model, as described on page 25, has three kinds of hosts, human, flies, and environment (B). The surveillance data used for fitting and validation is only for human hosts; there is no independent data for flies or the environment to validate these two parts of the model. While it is reality that no such data exists, it is a limitation on the modeling study. The reviewer would like to see this limitation discussed in the discussion, so that other readers can be aware of it.*

   Following the Reviewer's suggestion, we have added a section to the limitation section: <u>This model was calibrated and validated using human incidence only and therefore does not use independent data for the fly or environment reservoirs. Since empirical data for these reservoirs does not exist at this scale, these values were obtained</u>

through model fitting and could not be independently validated. This is an important limitation of the model and suggests that the collection of additional data for further model validation would be a useful next step. (Page 16, Line 356-360)