

Protocol for a scoping review

Title

A scoping review on the assessment of biosecurity measures specific to outdoor poultry farms in high-income countries.

Authors and their affiliations

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Author contributions

The review (PICO) question and protocol described in this document were developed with the contribution and final approval of all co-authors. Alessandra Piccirillo and Mattias Delpont drafted the protocol and all authors provided their input during its development.

Registration

This protocol is archived at Padua Research Archive (handle code: <https://hdl.handle.net/11577/3541199>) and published online through Systematic Reviews for Animals and Food (SYREAF) at <http://www.syreaf.org/>. It follows the PRISMA-P guidelines (Moher et al., 2015).

Support

This project was co-funded by the European Union under project no. 101136346.

Amendments

This review is not an amendment of a previously completed or published protocol. If amendments are made after registration, they will be clearly documented in the scoping review as Protocol Deviations.

Acknowledgements

The authors are thankful to Dr. Ronald Vougat Ngom (University of Ngaoundéré, Cameroon) for his expert suggestions during the drafting of this protocol. Special thanks also to COST Action CA20103, Biosecurity Enhanced Through Training Evaluation and Raising Awareness (BETTER), supported by COST (European Cooperation in Science and Technology).

Introduction

Rationale

Over the last decades, in high-income countries, alternative ways of growing poultry have been developed for a variety of reasons, such as animal welfare, environmental impact or the reduction of antimicrobial use. As a consequence, a growing number of farms involve access to an outdoor range (Walley et al., 2015; Scrinis et al., 2017). However, free-range poultry may be more exposed to pathogens than chickens raised in confinement (Bestman et al., 2018; McMullin et al., 2022). These pathogens may be directly or indirectly transmitted by wild birds and to a lesser extent by wild mammals, insects or gastropods (Xu et al., 2018). Some pathogens may also survive longer on the outdoor range in specific resistance forms (spores, oocysts) (Souillard et al., 2014), when they are telluric (Eriksson et al., 2013) or because of the difficulty to perform cleaning and disinfection on organic matter (Chandler-Bostock et al., 2015). In relation to the risk of infection from wild birds, any feature of the outdoor range having an impact on wild bird attractivity (water sources, vegetal cover) may increase the risk of infection. Moreover, some specific aspects of outdoor range management may also introduce pathogens transmission routes mediated by farm equipment accessing the outdoor run. In order to address these infectious challenges, on-farm biosecurity protocols should include specific items absent from "traditional" assessment tools which are initially developed for standardized production schemes with no outdoor access.

Objectives

The overall objective of this scoping review is to describe the methods used to identify and synthesize the available information on the assessment of biosecurity measures specific to

outdoor poultry farms in high-income countries (i.e., Europe, USA, Canada, Australia, New Zealand, Japan, and Russia).

The specific objectives are:

- to describe the existing literature on biosecurity assessment in outdoor poultry farms in high-income countries;
- to identify and discuss implemented biosecurity measures, along with methods and tools used for assessment in outdoor poultry farms in these regions;
- to identify and analyze knowledge gaps in biosecurity for outdoor poultry farms in high-income countries.

The specific PICO elements are:

1. **Population:** Poultry (limited to broilers, layers, turkeys, ducks)
2. **Interest:** Assessment of biosecurity measures in outdoor farms
3. **Context:** High-income countries (limited to Europe, USA, Canada, Australia, New Zealand, Japan, and Russia)

Methods

This scoping review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018).

Eligibility criteria

Inclusion criteria

Criteria related to the elements of the PICO question (Population, Interest, and Context).

1. Language: Publications in English, French, Spanish, and/or Italian.
2. Publication types: Journal articles that provide results of original research, fulfilling the study design eligibility criteria (e.g., observational, cross-sectional, longitudinal, case-control, cohort).
3. Publication date: No limits.
4. Geographical location of studies: high-income countries (i.e., Europe, USA, Canada, Australia, New Zealand, Japan, and Russia).
5. Availability of full-text articles.

This review will focus on poultry (broilers, layers, turkeys, and ducks) due to their significance in high-income countries such as Europe, USA, Canada, Australia, New Zealand, Japan, and Russia, considering the similarities in their poultry production systems and the overall climatic conditions.

Exclusion criteria

Articles that explored only farm biosecurity (or management issues) without mentioning the assessment methodology/tools will be excluded. Reviews, editorials, commentaries, and papers published in languages other than English, French, Spanish, and Italian will be excluded.

Information sources

To identify potentially relevant documents, the search will be conducted in four databases: Agricola (Ebsco interface) and Web of Science (Clarivate interface) available via Baylor University (USA), and Scopus (Elsevier interface) and Medline (PubMed interface) available via Ghent University (Belgium). All the databases of WoS will be used including ProQuestTM Dissertation & Theses Citation Index, KCI-Korean Journal Database, Medline, Preprint Citation Index, and SciELO Citation Index) except for Arts & Humanities Citation Index (A&HCI), Conference Proceedings Citation Index-Science (CPCI-S), and Conference Proceedings Citation Index-Social Science & Humanities (CPCI-SSH) because their research focus is not within the scope of this review.

Search strategy

The search terms will be the same for all databases, but the formatting will vary according to the different architectures of the databases. The concept of the search strategy will be the following:

[Biosecurity] AND [Outdoor farm] AND [Poultry] AND [Assessment] AND [High-Income countries].

The general search strategy to identify studies relevant to the PICO of this review will be the following:

#1 (biosecurity OR bio-security)

#2 (extensive OR free-range OR “free range” OR outdoor OR organic OR small-scale OR “small scale” OR “small holder” OR open-air OR “open air” OR pasture* OR yard*)

#3 (farm*)

#4 (poultry OR fowl* OR avian* OR bird* OR chick* OR broiler* OR layer* OR hen* OR gallus OR breeder* OR duck* OR anas OR turkey* OR meleagri* OR flock* OR livestock OR “food producing animal*” OR “food-producing animal*” OR “food animal*” OR “animal husbandry*” OR “domestic animal”*)

#5 (assess* OR risk* OR level* OR evaluation* OR adopt* OR implement* OR measure* OR scor* OR questionnaire* OR checklist* OR benefit* OR consequence* OR impact OR practice* OR compliance)

#6 (Europe* OR “European Union” OR EU OR Austria* OR Belgium OR Bulgaria* OR Croatia* OR Cypr* OR Czech* OR Denmark OR Estonia OR Finland OR France OR German* OR Gree* OR Hungar* OR Iceland OR Ireland OR “Irish Republic” OR Ital* OR Kosovo OR Latvia OR Lithuania* OR Luxembourg OR Malt* OR Montenegro OR Macedonia* OR Netherlands OR Norway OR Poland OR Portug* OR Romania* OR Serbia* OR Slovakia OR Slovenia* OR Spain OR Sweden OR Belarus OR Moldova OR Bosnia and Herzegovina OR

Ukraine OR Andorra OR Liechtenstein OR Monaco OR Switzerland OR “United Kingdom” OR UK OR England OR Scotland OR Wales OR “United States” OR “United States of America” OR US OR USA OR Canada OR Australia OR “New Zealand” OR Japan OR Russia* OR Soviet OR USSR)

#7: #2 AND #3

#8: #1 AND #4 AND #5 AND #6 AND #7

Selection of sources of evidence

Data management

All citations retrieved from the databases will be imported into EndNoteTM reference management software to delete duplicate and retracted articles. The two-phases screening process (title and abstract, and full text) will be performed in Rayyan. Data extraction will be done using Microsoft Excel[®].

Selection process

In the two-phases screening, citations will be screened by six independent reviewers working in pairs to reduce the possibility of excluding relevant reports. During both phases, each pair of reviewers will screen half of the citations. This will guarantee that each reference is screened by two independent reviewers. Conflicts among each pair will be solved with discussion or with a third reviewer if consensus is not reached. At the beginning of each screening phase, a calibration exercise, involving all the reviewers, will be conducted on at least 10% of the total number of papers available to increase consistency. This calibration exercise will enable discussion and solve disagreements before carrying out the full selection process (Sanguinetti et al., 2021).

Eligibility of studies will be assessed with the following questions:

1. Is the publication language English, French, Spanish or Italian?
2. Is the full text available?
3. Is the publication an original research article?
4. Is the study concerning broilers, layers, turkeys, breeders, and ducks?
5. Does the study concern commercial outdoor farms?
6. Does the study include biosecurity assessment?
7. Is the study performed in at least one high-income country?

During the title and abstract screening, the available answers will be “No,” “Maybe,” and “Yes.” Citations will be excluded if the two reviewers of a pair answer “No” to one of the questions, whereas citations with “Yes” or “Maybe” answers to all questions will be retained for full-text screening. During the full text screening, the available answers will be “No,” “Maybe,” and “Yes.” Only citations with “Yes” answers for all the questions will be included in the scoping review. The reasons for excluding articles will be provided in this step of the screening.

Data charting process

Data extraction

Four independent reviewers will carry out data extraction from the included studies by using a Microsoft Excel[®] spreadsheet created by one reviewer and validated by all. Data extraction will be performed after a calibration exercise as described above. After calibration, data from the remaining papers will be extracted by the reviewers working in pairs. If consensus between a pair will not be reached, conflicts will be solved by a third reviewer. Data extracted will include demographic information, methodology, and other details described below. The corresponding author will be contacted to resolve any uncertainties if necessary.

Data items

Data to be extracted from eligible studies will include the following items:

General information:

1. Study details (i.e., publication year, authors, journal)
2. Geographical location/country where the study was conducted
3. Time-frame and/or duration of the study (number of days/months)
4. Study design (cross-sectional, longitudinal, etc.)

Population data:

1. Poultry category: broilers, layers, turkeys, ducks
2. Type of production system (conventional, organic, short supply chain, etc.)
3. Number of farms
4. Number of animals in the farm

Interest data:

1. Biosecurity measures assessed (e.g. number, definition, etc.)
2. Tools used to assess biosecurity implementation on farms (e.g. questionnaire, etc.)
3. Scale used to measure biosecurity implementation on farms (e.g. scoring, percentage, etc.)

Synthesis of results

The results of the scoping review will be reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement guidelines, extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018).

A narrative synthesis will be provided with information presented as text, diagrams, and maps. Tables to summarize and explain the characteristics, findings and research gaps of the included studies will also be used. Results expressed as a range of scores for each assessed biosecurity factor will be presented according to animal species, sub-region, etc. Different tools used to assess biosecurity measures at farm level in high-income countries will be described.

Conclusions

This scoping review will provide a synthesis of the literature available on biosecurity assessment in outdoor poultry farms in high-income countries. Results will be helpful for researchers and policy-makers to address knowledge gaps concerning this topic that will require further research in the future.

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