

Scoping Review on Chemical Disinfection in Livestock Production

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Protocol registration

This protocol was made using the Preferred Reporting Items for Systematic Reviews and Meta Analysis Extension for Scoping Reviews (PRISMA-ScR) reporting guidelines. This protocol will be made available online at the Systematic Reviews for Animals and Food (SYREAF - <https://syreaf.org/>)

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Amendments

Any amendments to this protocol will be documented and justified in the final review

Rationale

Disinfection is a process in which most microorganisms, pathogenic or otherwise, are eliminated through physical or chemical methods (Freedman, 2012; Rutala and Weber, 2008). Differently from sterilization, it doesn't destroy all viable microorganisms, but alongside cleaning, is able to lower the biological pressure to a level that will ensure that most -if not all- animal pathogens and zoonotic agents are eliminated (Dewulf and Van Immerseel, 2019) and animals still have contact with optimal microbiome and a low pressure of pathogenic agents. It's part of an essential component of biosecurity programs in animal farming, by being able to prevent the persistence and spread of pathogens (Dewulf and Van Immerseel, 2019), and currently, there is an increase of cleaning and disinfection procedures in farms (Makovska et al, 2024).

Chemical disinfectants are an effective tool in disease and infection control, being utilized since the 1900s as a way to provide safe drinking water to humans (EPA, 2000) and introduced in human medicine in 1865 with the use of a chemical solution as an antiseptic (Michaleas, Laios and Charalabopoulos et al, 2022). As the technology advances, new generation of disinfectants substitute compounds that in the past could cause great impact on humans and animal health, and slowly regulatory entities such as ECHA (European Chemicals Agency) are working towards the regulation of less harmful compositions (ECHA, 2018).

The aim of this scoping review is to identify through the available literature what are the most commonly used compounds of chemical disinfectants in animal farming, their methods of application and the factors that most influence their effectiveness in the field.

Objectives

The goal of this scoping review is to identify through the available literature what are the most commonly used compounds of chemical disinfectants in animal farming, their methods of application, and factors that most influence their effectiveness in the field.

Inclusion criteria

PCC elements

- Population
 - o Terrestrial animals production (pigs, cattle and poultry)
- Concept
 - o Efficacy and use of chemical disinfectants
- Context
 - o Effect on the disease burden

Time frame: from 2000 onwards

Language of publications: English

Publication type: peer reviewed and free access articles

Methodology

Step 1: grey literature search on chemical disinfectants

In this first step, we will be looking into literature reports and governmental agencies to list what are the currently allowed formulations for PT3 (Veterinary Hygiene Biocidal Products) use and what is the current state of the art. After that, a list will be generated with the retrieved data, which will be used as a reference for used substances and search terms.

Step 2: literature search

Following the inclusion criteria; a literature search will be performed in PubMed, Web of Science and Scopus. The search strategy will involve a multi strand approach that uses a series of searches with different combinations of concepts, to gather all possibly related information. The list of published articles identified from the different databases will be imported to [Rayyan](#) to the screening of duplicates and the remaining articles will go through the inclusion or exclusion process, to then be added to Mendeley for reference management.

Information sources

Database	Interface	Date Coverage
Clarivate	Web of Science	2000 to present
Scopus	Scopus	2000 to present
Medline	PubMed	2000 to present

The general search strategy will be the following:

Search strategy PIGS #1	(((ALL=(Pigs* OR swine*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Acid*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy PIGS #2	(((ALL=(Pigs* OR swine*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Alkali*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy PIGS #3	(((ALL=(Pigs* OR swine*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Aldehyde*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy PIGS #4	(((ALL=(Pigs* OR swine*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Alcohol*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy PIGS #5	(((ALL=(Pigs* OR swine*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Phenolic compound* OR phenol*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy PIGS #6	(((ALL=(Pigs* OR swine*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Peroxide* OR Peracetic*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy PIGS #7	(((ALL=(Pigs* OR swine*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Halogen*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy PIGS #8	(((ALL=(Pigs* OR swine*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Quaternary ammonium compound* OR

	QAC*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy RUMINANTS #1	((((ALL=(cattle* OR herd* OR dairy* OR cow* OR ruminant* OR sheep* OR goat* OR livestock* OR hoof* OR teat*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Acid*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*))
Search strategy RUMINANTS #2	((((ALL=(cattle* OR herd* OR dairy* OR cow* OR ruminant* OR sheep* OR goat* OR livestock* OR hoof* OR teat*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Alkali*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*))
Search strategy RUMINANTS #3	((((ALL=(cattle* OR herd* OR dairy* OR cow* OR ruminant* OR sheep* OR goat* OR livestock* OR hoof* OR teat*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Aldehyde*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*))
Search strategy RUMINANTS #4	((((ALL=(cattle* OR herd* OR dairy* OR cow* OR ruminant* OR sheep* OR goat* OR livestock* OR hoof* OR teat*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Alcohol*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*))
Search strategy RUMINANTS #5	((((ALL=(cattle* OR herd* OR dairy* OR cow* OR ruminant* OR sheep* OR goat* OR livestock* OR hoof* OR teat*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Phenolic compound* OR phenol*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*))
Search strategy RUMINANTS #6	((((ALL=(cattle* OR herd* OR dairy* OR cow* OR ruminant* OR sheep* OR goat* OR livestock* OR hoof* OR teat*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Peroxide* OR Peracetic*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*))
Search strategy RUMINANTS #7	((((ALL=(cattle* OR herd* OR dairy* OR cow* OR ruminant* OR sheep* OR goat* OR

	livestock*OR hoof* OR teat*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Halogen*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy RUMINANTS #8	((((ALL=(cattle* OR herd* OR dairy* OR cow* OR ruminant* OR sheep* OR goat* OR livestock* OR hoof* OR teat*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Quaternary ammonium compound* OR QAC*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy POULTRY #1	((((ALL=(Poultry* OR chicken* OR broiler* OR layer* OR bird* OR avian OR hen* OR flock* OR eggs*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Acid*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy POULTRY #2	((((ALL=(Poultry* OR chicken* OR broiler* OR layer* OR bird* OR avian OR hen* OR flock* OR eggs*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Alkali*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy POULTRY #3	((((ALL=(Poultry* OR chicken* OR broiler* OR layer* OR bird* OR avian OR hen* OR flock* OR eggs*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Aldehyde*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy POULTRY #4	((((ALL=(Poultry* OR chicken* OR broiler* OR layer* OR bird* OR avian OR hen* OR flock* OR eggs*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Alcohol*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy POULTRY #5	((((ALL=(Poultry* OR chicken* OR broiler* OR layer* OR bird* OR avian OR hen* OR flock* OR eggs*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Phenolic compound* OR phenol*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy POULTRY #6	((((ALL=(Poultry* OR chicken* OR broiler* OR layer* OR bird* OR avian OR hen* OR flock* OR eggs*)) AND ALL=(Disinfection* OR

	disinfectant*))) AND ALL=(Peroxide* OR Peracetic*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*)
Search strategy POULTRY #7	(((((ALL=(Poultry* OR chicken* OR broiler* OR layer* OR bird* OR avian OR hen* OR flock* OR eggs*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Halogen*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*))
Search strategy POULTRY #8	(((((ALL=(Poultry* OR chicken* OR broiler* OR layer* OR bird* OR avian OR hen* OR flock* OR eggs*)) AND ALL=(Disinfection* OR disinfectant*))) AND ALL=(Quaternary ammonium compound* OR QAC*) AND ALL=(Efficacy* OR interference* OR action* OR effect* OR safety* OR action* OR inactivation*))

Selection process

To select the studies to include in the scoping review, two independent researchers will screen all the titles and abstracts retrieved from the proposed search approaches by answering the following questions:

- 1) Was this article published between 2000 and 2025? Yes [Include], No [Exclude]
+
- 2) Is this article in English? Yes [Include], No [Exclude]
+
- 3) Is this article peer reviewed? Yes [Include], No [Exclude]
+
- 4) Has this article examined the efficacy of a chemical disinfectant on animal pathogens/animal microbiome? Yes [Include], No [Exclude]
OR
- 5) Has this article examined the efficacy of a chemical disinfectant in farm conditions/animal production? Yes [Include], No [Exclude]

Step 3: data extraction

All relevant data from the included full-texts will be extracted and entered into data extraction forms, which will be designed using Microsoft Excel and will consist of: (1) the study details (i.e., publication year, authors, journal, geographical location); (2) the chemical being reported (i.e., quaternary ammonium compounds, peracetic acid); (3) target species/production of the study (i.e., pigs, salmon, poultry); (4) main findings (or outcomes) of the study (i.e., efficacy against biofilms, efficacy against *Salmonella*, interference of manure on efficacy).

Step 4: data synthesis

Data will be summarized and presented through descriptive methods ([summary narrative](#)). The data will also be presented in the form of visual aids (e.g., maps and graphs). Tables reporting means or medians, ranges, percentages, and/or coefficients of variation will be prepared where applicable.

Step 5: critical appraisal of individual sources of evidence

The selected articles will be analysed through [critical appraisal tools](#) and divided into articles of Low, Moderate and High quality.

References

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