



Journal of the Selva Andina Animal Science

ISSN: 2311-3766

ISSN: 2311-2581

directoreditoranimalscience@gmail.com

Selva Andina Research Society

Bolivia

Ramírez-Ozuna, Sara Maribel; Presentado-Prantte, Gregorio; Acuña-Caballero, Vicente Luis

Critical analysis of the definitions of reservoir and carrier in epidemiology

Journal of the Selva Andina Animal Science, vol. 10, no. 2, 2023, pp. 139-142

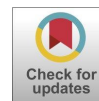
Selva Andina Research Society

Bolivia

DOI: <https://doi.org/10.36610/j.jsaas.2023.100200139x>

- Complete issue
- More information about this article
- Journal's webpage in redalyc.org





Critical analysis of the definitions of reservoir and carrier in epidemiology
Análisis crítico de las definiciones de reservorio y portador en epidemiología
Ramírez-Ozuna Sara Maribel¹, Presentado-Prantte Gregorio², Acuña-Caballero Vicente Luis^{1*}

Article Data

¹ National University of Canindeyú.
Faculty of Veterinary Sciences.
Department of Public Health.
San Cayetano Neighborhood.
Curuguaty.
Tel: +595961175738.
Paraguay.

² National University of Canindeyú.
Faculty of Veterinary Sciences.
Beef Cattle Production.
San Cayetano Neighborhood.
Curuguaty.
Tel: +595961175738.
Paraguay.

* **Contact address:**
Vicente Luis Acuña-Caballero

National University of Canindeyú.
Faculty of Veterinary Sciences.
Department of Public Health.
San Cayetano Neighborhood.
Curuguaty.
Tel: +595961175738.
Paraguay.

E-mail: veterinaria@fcaa.edu.py

Keywords:

Reservoir,
carrier,
epidemiology,
infection.

J. Selva Andina Anim. Sci.
2023; 10(2):139-142.

Article history

Received: April, 2023.
Returned: June 2023.
Accepted: August, 2023.
Available online, October 2023.

Article ID: 132/JSAB/2023

Edited by: Selva Andina
Research Society

Palabras clave:

Reservorio,
portador,
epidemiología,
infección.

Mr. Editor.

Most authors, in articles and texts on epidemiology, differ in certain terms in the definitions of carrier and reservoir, so it is interesting to analyze them in order not to fall into confusions that lead to a misunderstanding, and therefore in their responsibility in the epidemiology of the disease, since the reservoir can easily be confused conceptually with the carrier, being very different in origin, considering also that the sanitary measures aimed at combating the disease are based on these concepts.

In this letter, a critical analysis of these definitions was carried out, according to each of the most important authors. The statements made are important to understand the epidemiology of diseases, to define the epidemiological chain, therefore, the epidemiological model, and finally the strategies for combating diseases.

The terms reservoir and carrier, in epidemiology, are strategically important, considering that the reasoning in this discipline is based on the dynamics of the disease. Consequently, the participation of these two elements in such reasoning are extremely fundamental components.

Discussion and analysis

Different authors define reservoir and carrier as sources of infection, responsible for maintaining an agent in a given individual/environment/ecosystem.

The definition of carrier is not found in the official glossary of the World Organization for Animal Health¹, but in the literature as "any host that maintains an infectious agent in its organism", citing 3 types of carriers, the healthy or sub-clinical, the convalescent, and the incubation period.

Jaramillo Arango & Martínez Maya² define a reservoir as: "any human being, animal, arthropod, plant, soil or matter capable of maintaining an agent for a prolonged period of time in a given area. The natural habitat in which it lives, multiplies, grows or both, on which its survival depends and on which it can be transmitted to a susceptible host".

A carrier is defined as: "an individual harboring a specific infectious agent of a disease, without showing signs or clinical symptoms of the disease, or both, and in a position to transmit the agent".

As can be seen, it does not differ much from the definition of reservoir, which leads to confusion between the two terms.

Thrusfield³ defines a carrier as "an animal that eliminates an infectious agent without manifesting clinical symptoms", this author refers to the reservoir as a synonym of "host", or suffixes reservoir as "reservoir host", as "one in which an infectious agent normally lives and multiplies and which, therefore, is a usual source of infection for other animals".

Toma et al.⁴ explain that "sometimes an organism, after its cure, can play a role as a source of infection for another organism as a carrier of germs".

On the other hand, they explain that "in certain cases, organisms infected inapparently represent, at the individual level, a very important source of pathogens, taking into account the high titer reached by the infectious agent in certain tissues, especially blood, and constituting the reservoir of the disease".

As can be seen, one definition does not differ much from the other in its contextualization and lends itself to confusion, with the "individual" always being taken as the basis of explanation.

Jenicek & Clèroux⁵ define a germ carrier as "an individual harboring a pathogenic agent and susceptible to transmission to others. In practice, it is usually reserved for subjects without apparent clinical symptoms".

When explaining the term reservoir, they do so with a projection towards the ecosystem, encompassing a much broader explanation, incorporating other actions such as the circulation of the agent in different species, and terms such as nest, biotope and biome.

These authors refer thus, "pathogens for other animal species can persist in the environment without infecting humans. The set of these species and their ecosystem and the elements that ensure circulation are designated by various expressions: natural reservoir (nest) of infection, biotope, biome".

Rosemberg⁶, is quite similar to all the above-mentioned definitions of carrier, stating that it is "any host that maintains in its organism an infectious agent without showing signs of the disease".

As for the reservoir of an agent, it also considers it to be "any individual capable of maintaining an agent for a prolonged period of time in a given area".

However, in the definition of types of reservoirs, it refers to ecological reservoirs as "an animal species not susceptible to the disease produced by it, but in which said agent can multiply and be eliminated in such a way as to allow its transmission to any susceptible host that comes into contact with it".

Also, when referring to epidemiological reservoirs, it defines them as "any animal species that, because it is not subject to control and observation, can maintain an agent and transmit it to susceptible domestic species of sanitary interest with which it comes into contact".

With this conceptual vision, it can be affirmed that an individual belonging to a species considered a reservoir of a given agent can behave as a carrier of that agent, as a unit. In fact, the behavior of

this carrier, in interaction with the agent, will determine, in its projection to the population, the characteristics of the reservoir species to which it belongs.

From all these expressions it is clear that the definitions of both terms can easily be confused, since when referring to the carrier and the reservoir, they allude to an individual, with the exception of some authors mentioned above, thus also confusing their functions.

Conclusión

The carrier status, therefore, results from an interaction between the pathogen and the individual or host.

The reservoir status implies the interaction of the pathogenic agent, the species and the ecosystem, the environment, both biological, physical and economic-social.

Thus, the definition of carrier is clear, it definitely refers to the individual in its different states, incubation, convalescent, subclinical and that its probability of transmitting the pathogenic agent is temporary, for periods of time, variable according to the type of disease.

The definition of reservoir is the species or (are) the species capable of maintaining the circulation of an agent in a given environment for an indefinite period of time, incorporating the elements of the ecosystem in which it is found.

These clear statements will have a fundamental and extremely important contribution to understand the epidemiology of diseases, to define the epidemiological chain, therefore, the epidemiological model and finally the appropriate strategies to combat diseases.

In summary, over the last few years, scientific research has contributed significantly to clarifying the complex dynamics of infectious diseases, particularly with regard to the notions of carrier and reservoir. These definitions, based on empirical evidence and epidemiological theory, have evolved our understanding of how pathogens interact with individuals and their environment.

The clear distinction between carrier and reservoir has become fundamental to the design of effective disease control and prevention strategies. We now know that a carrier, although it can transmit the pathogen temporarily, does not maintain it in a sustained manner in the population. In contrast, the reservoir, which involves the interaction of species and ecosystems, is the key to the long-term persistence of an infectious agent in a specific environment.

These refined definitions not only contribute to the understanding of disease epidemiology, but also provide a solid basis for the identification of epidemiology and the formulation of accurate epidemiological models. As a result, disease control strategies benefit from this knowledge, enabling a more effective response tailored to the specific characteristics of each disease.

In a world where public health threats are increasingly diverse and complex, these research-backed findings are essential to inform health policies and prevention strategies that safeguard the health of global communities. Our evolving understanding of carriers and reservoirs in infectious diseases promises a safer and healthier future for all.

Conflicts of interest

The authors declare that they have no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Ethical considerations

The expressions and proposals of the authors cited in the analysis and discussion have been respected at all times in the definition and conceptualization of the terms addressed in the article.

Acknowledgments

To the Universidad Nacional de Canindeyú-Facultad de Ciencias Veterinarias, in the person of the Dean of said Institution, Prof. Dr. Arístides Britos Cano, to Professors Dr. José Daniel Samaniego Gauna, Career Director, and Carlos Vera, Head of the Research Department, for their constant support and facilitation of research work.

Authors' contribution to the article

The contribution of each of the authors was: *Vicente Luis Acuña Caballero*, analysis of the terms studied and their conceptualization, as well as the writing and editing of the document. *Sara Maribel Ramirez Ozuna*, literature research, revision and editing. *Gregorio Presentado Prantte*, methodology and analysis, discussion, revision and editing.

Literature cited

1. Organización Panamericana de la Salud, Organización Mundial de la Salud, Banco Interamericano de Desarrollo. Programa de Adiestramiento en Salud Animal para América Latina [Internet]. México: México; 1988 [citado 2 de julio de 2023]. 401 p. Recuperado a partir de: https://iris.paho.org/bitstream/handle/10665.2/51232/9275320098_spa.pdf?sequence=1&isAllowed=y
2. Jaramillo Arango CJ, Martínez Maya JJ. Epidemiología Veterinaria [Internet]. México: Manual Moderno; 2011[citado 22 de julio de 2023]. 217 p. Recuperado a partir de: <https://zoovetempasion.com/libros-zootecnia-veterinaria/libros-veterinaria/libro-epidemiologia-veterinaria-jaramillo>
3. Thrusfield M. Epidemiología veterinaria. Zaragoza: Editorial Acribia S.A; 1990. 339 p.
4. Toma B, Dufour B, Bénét JJ, Rivière J, Shaw A, Moutou F. Epidemiology applied to the collective fight against major transmissible animal diseases. *Med Mal Infect* 1996; 26 (Suppl 5): 686. DOI: [https://doi.org/10.1016/S0399-077X\(96\)80098-9](https://doi.org/10.1016/S0399-077X(96)80098-9)
5. Jenicek M, Clèroux R. Épidémiologie: principes, techniques, applications. Edisem: Saint-Hyacinthe; 1982. 454 p.
6. Rosemberg FJ. Principios de Epidemiología [Internet]. Rio de Janeiro: Organización Panamericana de la Salud; 1977 [citado 12-de agosto de 2023]. 95 p. Recuperado a partir de: <https://iris.paho.org/handle/10665.2/51201?locale-attribute=es>

Editor's Note:

Journal of the Selva Andina Animal Science (JSAAS). All statements expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, editors and reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.