

SNAPP - SOUTH AMERICAN CAMELIDS PROJECT:  
**DISEASES IN SOUTH AMERICAN WILD CAMELIDS (SAC)**  
DATA SYSTEMATIZATION ADVANCES

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This paper presents a summary of the advances in the systematization of data that have been worked on within the framework of SNAPP: Addressing the impacts of Sarcoptic mange on South American wild camelids in a landscape of myths and legends.



### Brief description of the project:

The objective of this research is to obtain evidence to understand the severity and impact of mange in South American camelid (SAC) populations: uña (*Vicugna vicugna*) and guanaco (*Lama guanicoe*), as well as the effectiveness of veterinary treatments, and to identify if there are environmental and management factors that could be related to the occurrence and prevalence of the disease.

In the first work meeting held in 2020, it was agreed to work on four main topics: prevalence of mange in SAC, environmental factors associated with mange, management factors associated with mange in SAC, and effectiveness of veterinary treatments. For each topic, the following main research questions were identified:

Prevalence and severity of the disease and its impacts on populations	How is the prevalence of mange in SAC? (¿Cómo es la prevalencia de la sarna en los CSA?)
Environmental factors related to the appearance, spread and prevalence of the disease	Are environmental conditions correlated with mange prevalence? (¿Las condiciones ambientales están correlacionadas con la prevalencia de la sarna en CSA?)
Management factors related to the appearance, spread and prevalence of the disease	Does management increase mange prevalence? (¿El manejo de los CSA para el aprovechamiento de fibra y carne aumenta la prevalencia de la sarna?)
Veterinary treatments and effectiveness	What is the effectiveness of the veterinary treatments implemented? (¿Cuál es la efectividad de los tratamientos veterinarios implementados para el control de la sarna en CSA?)

To address these questions, indicators and factors or sources of variability were defined, based on more detailed questions generated for each topic (see methodological documents) that would serve to guide the process of searching for existing data. Among the main indicators are:

- **Mange prevalence:** percentage of individuals positive for mange in relation to the total evaluated and percentage of individuals with lesions compatible with mange in relation to the total evaluated.
- **Degree of severity:** number of different mange lesions per individual and percentage of body affected by mange per individual.
- **Mortality:** number of dead individuals with lesions compatible with mange.
- **Fiber growth:** presence of fiber in the area with mange lesions.

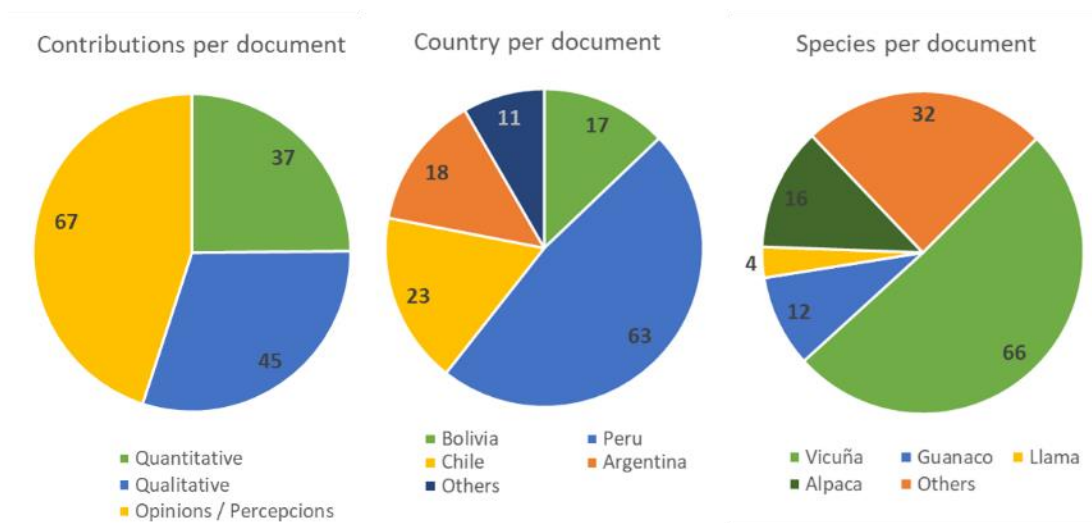
The data search was conducted on the basis of two sources of information:

- **Published information:** published information (scientific articles, technical reports, presentations at congresses, theses, press releases, informative materials, among others), which has been identified, selected, evaluated and organized from a systematic review based on a standardized methodology (see methodological documents).
- **Unpublished information:** information from shearing records, captures or animal sampling.

For both sources of information, databases have been generated to evaluate the proposed indicators and associate them with environmental and management factors, spatially and temporally. A summary of the type and volume of information obtained is presented below.

### Data from published sources:

From the search for published information, 212 documents related to the established questions were identified (according to the proposed methodology), of which 132 documents were included in the systematic review after evaluating their contributions and the quality of the information. Of these, 37 present quantitative data related to scabies prevalence, severity, mortality, effectiveness of treatments, including 16 documents with reliable data for meta-analysis. The rest present qualitative data (45 documents) and opinions or perceptions based on knowledge (67 documents).

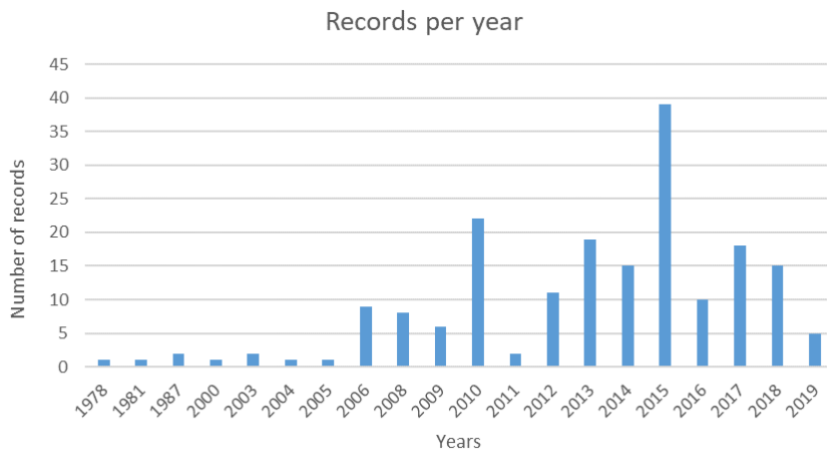
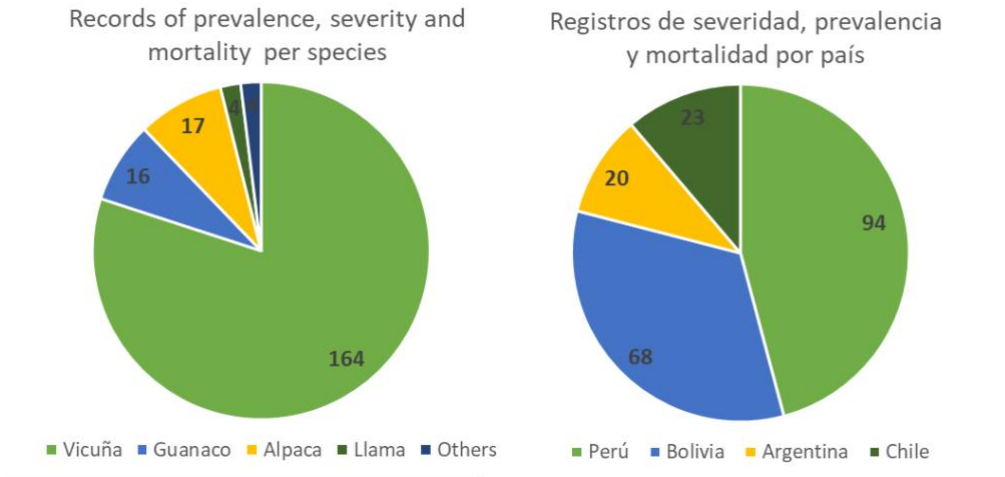


Documents with data were obtained mainly from **Peru (63), Chile (23), Argentina (18) and Bolivia (17)**. These documents presented data on mange in **vicuñas (66), guanacos (12)** and other camelids and domestic animals associated with SACs.

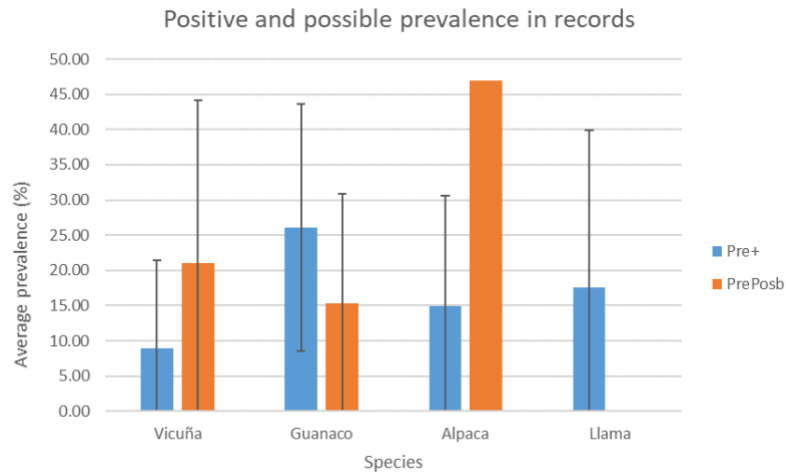
Three databases were generated from these documents: 1) databases on prevalence, severity and mortality of mange in SAC populations (PreSevMor), 2) databases on veterinary treatments implemented to treat scabies in SAC populations (Treatments) and 3) databases on opinions and perceptions related to the importance of mange in SAC populations (Perceptions).

The **PreMorSev database has 205 records**, of which 188 are georeferenced. There were **164 records of mange prevalence or mortality (possible or positive mange) for vicuñas, 16 for guanacos, 17 for**

alpacas, among other species. These records come from **Peru (94)**, **Bolivia (68)**, **Chile (23)** and **Argentina (20)**. The records are distributed in at least 18 departments/regions, 26 provinces and 34 districts/municipalities that could be identified, and cover a time period from 1978 to 2019, being more frequent between 2010 and 2019.

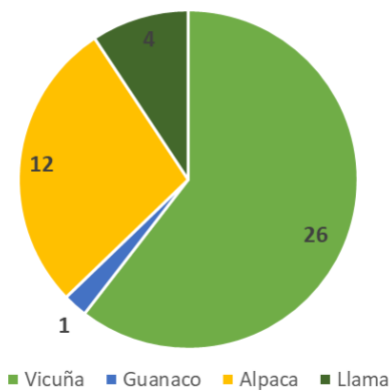


From this information, the prevalence of individuals with positive and probable mange lesions (as a percentage of the total number of individuals reported), among others, was calculated for each record. The averages by species are shown below.

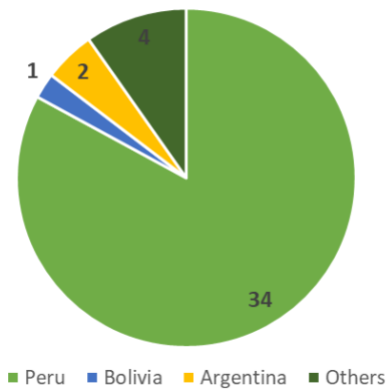


The **Treatments database** has **41 records**, of which 33 are geo-referenced. Most of these records come from treatments implemented on **vicuñas (26)** and **alpacas (12)** and come mainly from **Peru (34)**.

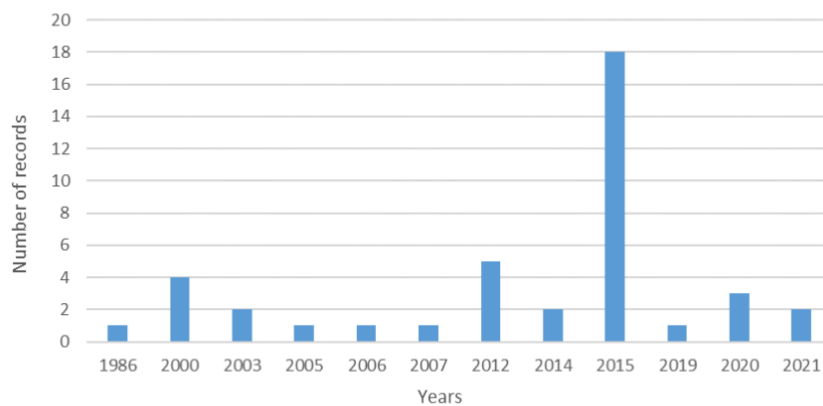
Treatment records by species



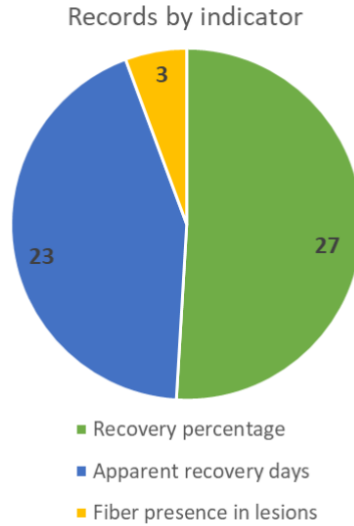
Treatment records by country



Records per year

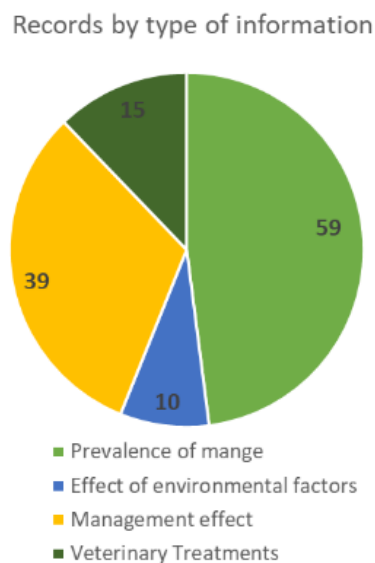


The records include information on the three indicators proposed to evaluate the effectiveness of the treatments: **percentage of individuals recovered (27)**, **days of apparent recovery (23)** and **presence of fiber in lesions (3)**.



Additionally, the database records information associated with the type and concentration of drug used in the treatment, dosage, route of administration and alternative treatments.

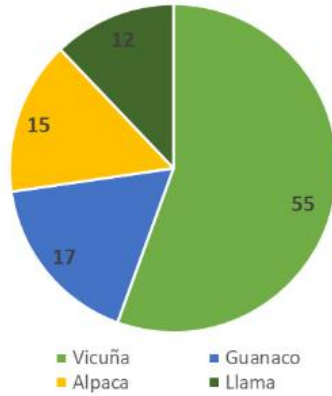
The **Perceptions database has 96 records**, of which 73 are geo-referenced, including information on **perceptions related to the prevalence of mange in SAC (59)**, **the effect of environmental factors on the prevalence of mange in SAC populations (10)**, **the effect of management on the prevalence of mange in SAC populations (39)** and **the effectiveness of veterinary treatments implemented (15)**.



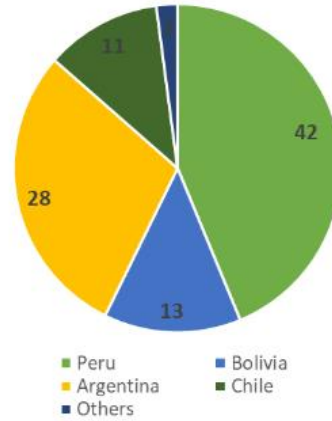
**Fifty-five records of perceptions associated with vicuñas, 17 with guanacos** and the remainder for domestic camelids were compiled. These include **42 records for Peru, 28 for Argentina, 13 for Bolivia**

and 11 for Chile, with data on perceptions from 1991 to 2021, including records from 1544, in which a low prevalence of mange is reported for vicuñas and guanacos, as well as high for alpacas and llamas, according to Inca Garcilaso de la Vega.

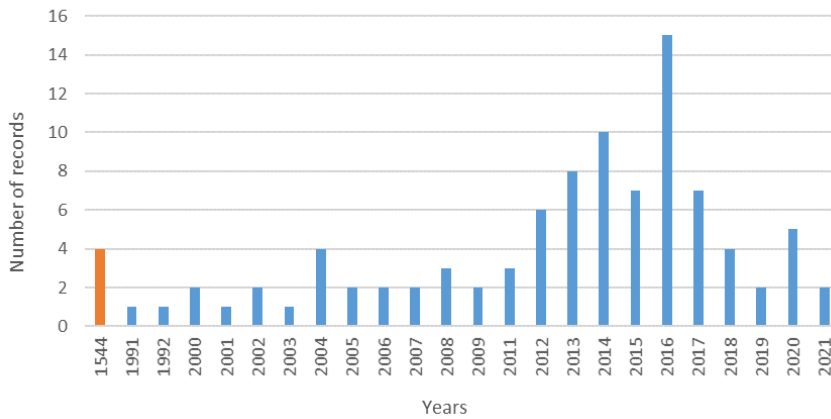
Perceptions records by specie



Perceptions records by country



Records per year



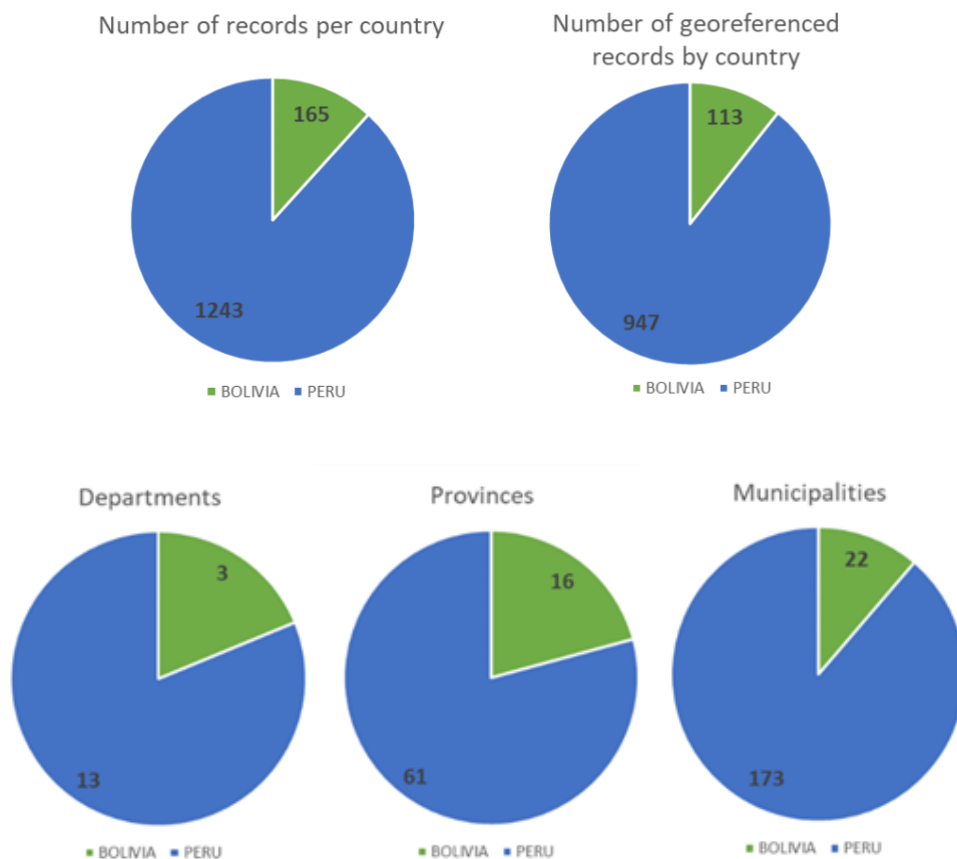
In addition, genetic information has been systematized for some SAC populations, such as haplotype diversity, nucleotide diversity, population growth, genetic variability, among others. This information was systematized in an independent database.

For all databases, additional information was collected related to environmental factors (vegetation, precipitation, temperature, land use, among others) and management factors that are expected to be associated with the evaluation of the indicators. In the case of geo-referenced data, these can be spatially associated to spatial variables such as ecosystems, land use, precipitation, temperature, altitude, or any other variable identified as relevant for the analyses.

**All this information can be found in the databases published together with the following documents**

**Data from unpublished sources:**

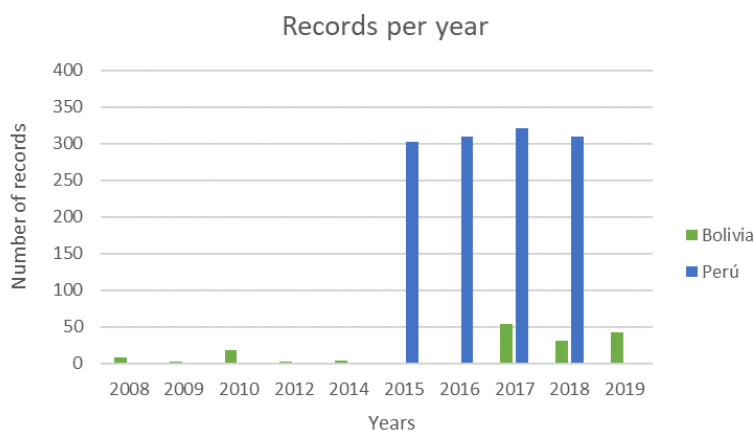
We were able to compile information on shearing records, captures or sampling of animals from **Peru and Bolivia**, generating a database of **1408 records**.



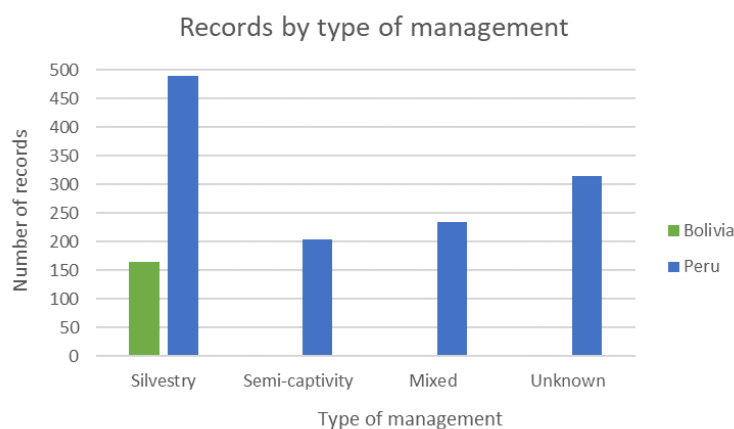
For **Peru**, **1243 records were obtained**: distributed in 3 departments, 61 provinces and 173 districts, of which **947 could be georeferenced**. For **Bolivia**, **165 records were obtained**: distributed in 3 departments, 16 provinces and 22 municipalities, of which **113 could be georeferenced**. These records will be spatially represented by localities (in the case of having coordinates) or by district/municipality in order to make comparisons that include other spatial data such as ecosystems, land use, precipitation, temperatures, altitude, or any other variable identified as relevant for the analyses.



The records cover a period from **2008 to 2019**, with 2015 to 2019 being the years with the most information.

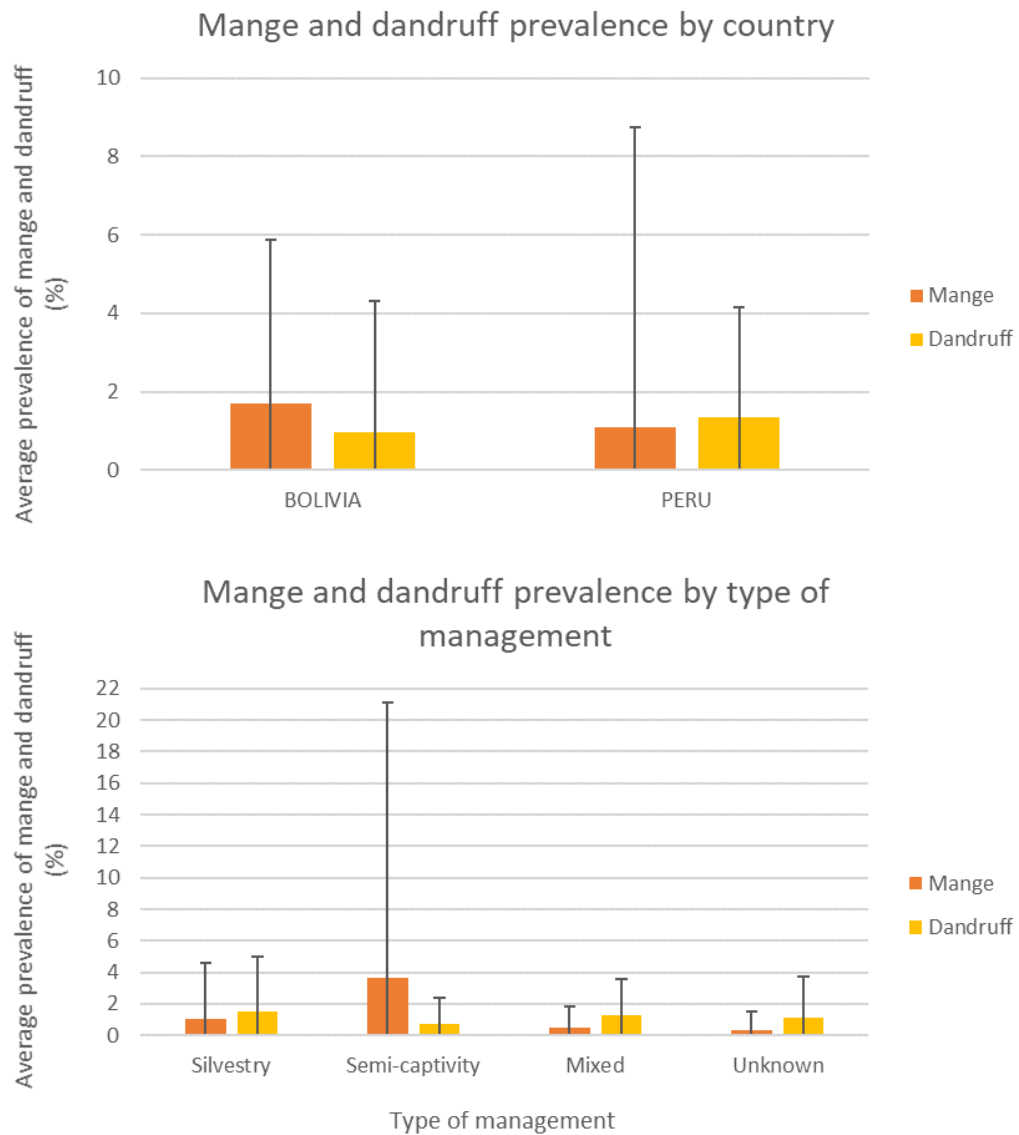


Most of the populations from which records were obtained could be classified according to the type of management to which they are subjected, with **Bolivia (168 records) being in silvestry in all cases**, and **Peru (498)** presenting the majority of cases in silvestry, although data were also recorded for populations managed in semi-captivity (205) and in mixed management (234).



The information collected and systematized includes data on the **size of the population under management, number of individuals sheared, captured or sampled for each locality and year, number of individuals with lesions compatible with mange, number of individuals with dandruff, number of dead individuals, number of treated individuals**, as well as information relevant to sex ratio, age ratio, body condition of the population for each year. All these variables have been defined in specific fields in the database and described in a metadata section. The source of each information has been included in the database.

From this information, the prevalence of individuals with lesions compatible with mange and the prevalence of individuals with dandruff (both as a percentage of the total number of sheared individuals), among others, have been calculated for each record. The averages by country and type of management are shown below.



**All this information has been systematized in databases. Access to the databases must be authorized by SERFOR.**

**Suggested quote:**

Isasi-Catalá, E., Gallegos, A., Hostos-Olivera, L., Martín, A., Walzer, C., Salgado-Caxito, M., Beltrán-Seminario, F., Montoya, M., Smith, S., Dougnac, C., Gaynor, K., Wallace, R., Camata, D., De la Cruz, F., Mena, J.L., Colchao, P. (2023). *Bases de Datos de la revisión sistemática del proyecto Abordando los impactos de la sarna sarcóptica en camélidos sudamericanos silvestres a través de un paisaje de mitos y leyendas*. Wildlife Conservation Society.

This document is the result of the Diseases in Wild South American Camelids working group of the Science for Nature and People Partnership (SNAPP). SNAPP is a partnership of The Nature Conservancy and Wildlife Conservation Society.

**References cited**

- Pullin, A.S. and Knight, T.M. (2001) ‘Effectiveness in Conservation Practice: Pointers from Medicine and Public Health’, *Conservation Biology*, 15(1), pp. 50–54.
- Pullin, A.S. and Knight, T.M. (2003) ‘Support for decision making in conservation practice: an evidence-based approach’, *Journal for Nature Conservation*, 11(2), pp. 83–90. Available at: <https://doi.org/10.1078/1617-1381-00040>.
- Sutherland, W.J. et al. (2004) ‘The need for evidence-based conservation’, *Trends in Ecology & Evolution*, 19(6), pp. 305–308. Available at: <https://doi.org/10.1016/j.tree.2004.03.018>.