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# Editorial: Foodborne zoonotic parasites and parasitoses

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## Editorial on the Research Topic

### Foodborne zoonotic parasites and parasitoses

The complex life cycles of parasites are dynamic. Parasites are living organisms that can adapt to new hosts or change their preferences according to geographic regions. People are either obligate or accidental hosts of numerous zoonotic parasitic species. Historically, many parasitic diseases have been classified as neglected diseases and have been associated with developing countries and low-income human populations (1). However, some important parasites are also widely present worldwide, are even re-emerging in some countries (2, 3), and represent a persistent threat to global health.

The transmission routes of parasites are numerous. Among the indirect routes, food (including water) is one of the main ones. Foodborne parasites are not only those whose etiological agents deliberately use food for their transmission, such as *Fasciola hepatica*, which encysts as metacercariae in vegetables, or *Trichinella spiralis*, which is encapsulated in meat (endogenous contamination), they also include parasites transmitted by contaminated water and raw vegetables (exogenous contamination) (4). Many groups of zoonotic parasites can be classified as foodborne ones, as those that are fecal-orally transmitted by means of cysts or oocysts, as *Toxoplasma gondii*; or through eggs or larvae, as gastrointestinal helminths. Another group of foodborne zoonotic parasites includes those that survive within the hosts until the consumption, either encysted or encapsulated, as *Taenia solium*, *Trichinella* spp. or, again, *T. gondii*. Foodborne diseases are among the most important zoonoses in public health. Thus, food production systems pose a challenge and threat to human health.

This Research Topic explores three fundamental aspects of knowledge: surveillance in wild animals, the compilation of prevalence and assessment of risk factors in specific populations, and the evaluation of prevention actions and their impact.

Small-scale research is often underestimated. However, the results obtained in local research can have repercussions first at a regional level and then at a global level.

Surveillance of zoonotic parasites in wild animals has become a central issue in recent decades because wildlife is now recognized as playing an important role in the reservoir of zoonotic diseases, either as maintenance populations or as parasite disseminators among locations. In the case of the genus *Trichinella*, both roles have been described depending to the parasite species. *Trichinella spiralis* is mainly associated with domestic cycles, while the other species primarily have sylvatic cycles. In this Research Topic, [Andrade et al.](#)

conducted a surveillance of *Trichinella* in wildlife in São Paulo state, Brazil, using direct methods, artificial digestion and histopathology. The surveillance of *Trichinella* in Brazil is important given the reported presence of *T. spiralis* in the neighboring countries Argentina and Chile and *T. patagoniensis*, *T. pseudospiralis* and *T. britovi* in Argentina.

Prevalence studies and risk factors analyses are relevant on a local scale, because they serve as basis to determine priorities and make decisions. But they are also relevant on a more global scale to have a wider view of the impact of the foodborne zoonotic parasitoses and to identify the most important factors that transversally affect their occurrence. Tekalign et al. estimated the prevalence of intestinal parasites, including soilborne parasites and *Schistosoma mansoni* in school-aged people (7-14 years old) of Mizan Aman City, Ethiopia. In their study they also assessed the risk factors associated with the occurrence of these parasites. Their results can help authorities to prioritize and make decisions, for instance, where to focus the education.

Biochemical indicators usually tell us how our system works. Serum 25-Hydroxyvitamin D [25(OH)D] concentration reflects the 25(OH)D in our system, where concentrations lower than 50 nmol/L are considered deficient and levels of 75 nmol/L, adequate. A 25(OH)D deficiency is associated with immune deficiency because it balances the T-helper lymphocyte subpopulations. But 25(OH)D can also be associated with behavior since it correlates with outdoor activities, and both facts can affect the presence of *T. gondii*. Huang et al. assessed the relationship between the serum 25(OH)D concentration and the presence of *T. gondii*. Unlike from previous studies, they controlled for several factors that can affect this association and found an interesting non-linear association. Their results provide insights that could be useful for designing preventive and therapeutic strategies.

Globally, pork is the most consumed meat product on average per capita according to FAO (5). Production and consumption vary among countries, and even among continents, but international trade in live animals, slaughtered animals or their products disrupts regionality and represents a health risk. In addition, pork can be the source of mayor foodborne parasitic zoonosis for humans, such as neuro-cisticercosis, trichinellosis or toxoplasmosis. On the other hand, it is important that the scientific research does not remain confined to the laboratory of field work but instead connects with society. Several mechanisms have been designed to achieve this, such as public seminars, school activities and dissemination through social media. However, few mechanisms require prior

peer revision and approval, one such example being a policy brief. In this Research Topic Ngowi et al. presented 14 recommendations for prevention and control of taeniasis and neurocysticercosis caused by *T. solium* in Tanzania based on scientific evidence. In their proposal, authors also suggest specific implementers, timelines and indicators.

Thus, this Research Topic encompasses different groups of foodborne zoonotic parasites including a protozoon, cestodes and nematodes; different types of studies, such as prevalence and risk factors analyses, epidemiological surveillance, biochemical studies, and policy proposal. After reading these articles, the reader will have the opportunity to further investigate the areas of greatest interest; or to repeat these investigations locally.

## Author contributions

MW: Conceptualization, Writing – original draft, Writing – review & editing. CL-A: Conceptualization, Writing – original draft, Writing – review & editing.

## Conflict of interest

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