

The global molecular epidemiology of microsporidia infection in sheep and goats with focus on *Enterocytozoon bieneusi*: a systematic review and meta-analysis

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Abstract:

Background: Microsporidia is a zoonotic pathogen with health consequences in immunocompromised patients. Small ruminants are a potential reservoir of microsporidia for humans in their vicinity. Hence, we aimed to evaluate the molecular prevalence of microsporidian infections with emphasis on *Enterocytozoon bieneusi* genotypes among sheep and goats at a global scale through systematic review and meta-analysis approach.

Methods: The standard protocol of preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines were followed. Eligible prevalence studies on small ruminant microsporidiosis, published from 1 January 2000 until 15 April 2021 were gathered using systematic literature search in PubMed, Scopus, Web of Science and Google Scholar databases. Inclusion and exclusion criteria were applied. The point estimates and 95% confidence intervals were calculated using a random-effects model. The variance between studies (heterogeneity) was quantified by I² index.

Results: In total, 25 articles (including 34 datasets) were included for final meta-analysis. The pooled molecular prevalence of microsporidia in sheep and goats was estimated to be 17.4% (95% CI: 11.8–25%) and 16% (95% CI: 11.2–22.4%), respectively. Likewise, the overall prevalence of *E. bieneusi* was estimated to be 17.4% (95% CI: 11.8–25%) for sheep and 16.3% (95% CI: 11.3–22.8%) for goats. According to internal transcribed spacer (ITS) gene analysis, *E. bieneusi* with genotypes BEB6 (15 studies) and COS-1 (nine studies) in sheep, and CHG3 (six studies) and BEB6 (five studies) in goats were the highest reported genotypes.

Conclusion: The present results highlight the role of sheep and goats as reservoir hosts for human-infecting microsporidia. Therefore, this global estimate could be beneficial on preventive and control measures.

Keywords: Microsporidia, *Enterocytozoon bieneusi*, Sheep, Goat, Meta-analysis