Epidemiology and diversity of gastrointestinal tract helminths of wild ruminants in Sub-Saharan Africa – A review

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Abstract

The review summarized studies reporting on the distribution, diversity, and prevalence of GIT helminth infections in wild ruminants in sub-Saharan Africa. The key findings: 109 GIT helminth species/complexes were recorded across 10 countries, with South Africa reporting the highest number. GIT nematodes were the most prevalent, with 88 species or complexes reported from 30 wild ruminant species across eight countries. *Trichostrongylus* spp. and *Haemonchus* spp. were the most widely distributed genera. Fifteen GIT trematode species/complexes were reported from seven countries, with *Paramphistomum* spp. and *Calicophoron* spp. being the most common. Six GIT cestode species or complexes from one family were found in 14 wild hosts across 7 countries, with *Moniezia* spp. being the most widely distributed host range and geographically. Impala, Nyala, and Greater kudu harbored the highest number of GIT nematodes, trematodes, and cestodes, respectively. The prevalence ranged between 1.4-100% for nematodes, 0.8-100% for trematodes, and 1.4-50% for cestodes. Findings indicate that wild ruminants are infected by a wide range of GIT species of conservation and zoonotic importance.

Introduction

- ✓ Helminths are a diverse group of parasitic worms that infect both animals and humans.
- ✓ They pose significant threats to conservation efforts, restricting the ranges of host species and endangering species of conservation concern, such as the African buffalo, Nile lechwe, Mountain reedbuck, Mountain gazelle, and Walia ibex which occur in sub-Saharan Africa.
- ✓ Knowledge of helminth infections in the wildlife of a given area and baseline measures of parasite richness, prevalence, and intensity in wild populations in conservation biology is critical
- ✓ Assist in tracking emergence of new parasites or changes in abundance or disease conditions associated with existing parasites can be determined

Aim

- ✓ To collate existing scientific data highlighting the distribution, diversity, and prevalence of GIT helminths in wild ruminants in sub-Saharan Africa.

Methods

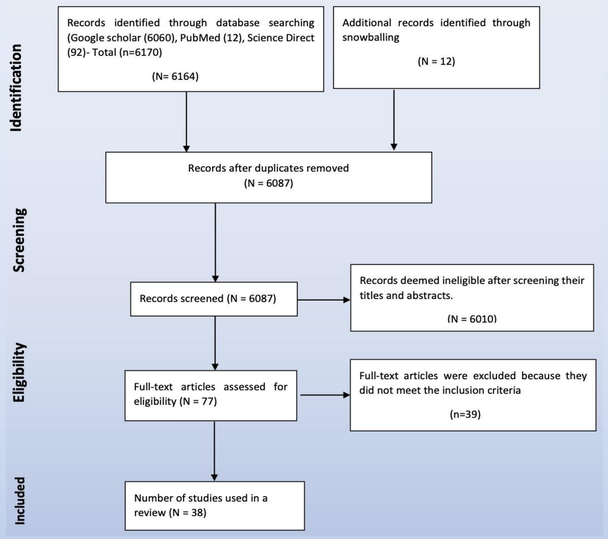
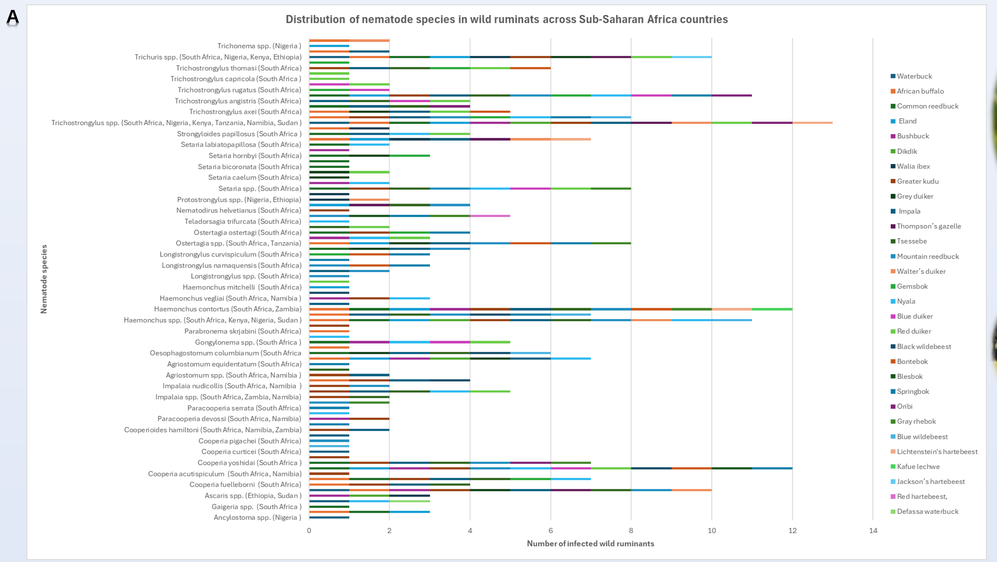


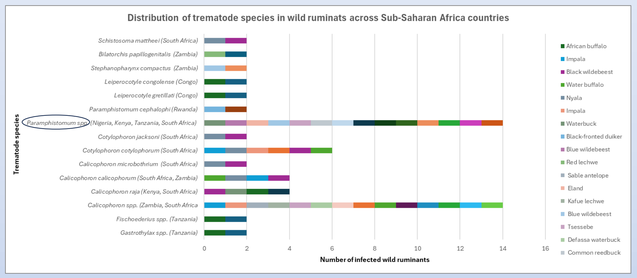
Fig. 1. PRISMA diagram

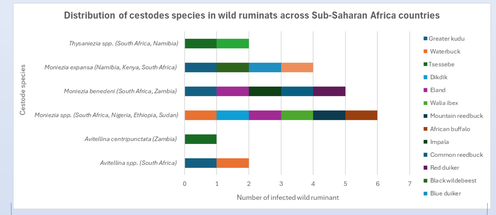
Results













Moniezia spp. eggs.

Fig 2: The distribution of nematodes (A), trematodes (B) and cestode (C) infections and host species in sub-Saharan Africa

Conclusion

- ✓ Available of data in only 10 countries highlighted underreporting of GIT helminths, especially trematodes and cestodes, wild ruminants in sub-Saharan Africa.
- ✓ *Trichostringylus genus* lead in recording the highest number of species and infecting the highest number of wild ruminant species.
- ✓ However, *Haemonchus contortus* was the most distributed species as expected.
- ✓ *Paramphistomum* recorded the highest number of species, and *Calicophoron* spp. was the most commonly occurring trematode
- ✓ *Moniezia* spp. were the most commonly distributed in terms of host range and geographically.
- ✓ Impala and Nyala were more susceptible to nematode and cestode and trematode species infections respectively, which is associated with their abundance, environment and feeding habits
- ✓ Intensive and broader surveys should be conducted in sub-Saharan African countries focusing on the distribution, infection burden and species diversity.
- ✓ Improved diagnostic tools such as Next Generation Sequencing (NGS) should be used to distinguish between species and further ensure identification to species level

References

- ✓ Boomker J, Keep ME, Flamand JR and Horak IG (1984). The helminths of various antelope species from Natal. *Onderstepoort Journal of Veterinary Research* 51, 253-256.
- ✓ Brooks DR and Hoberg EP (2006). Systematics and emerging infectious diseases: from management to solution. *Journal of Parasitology* 92, 426-429.
- ✓ Junker K, Horak IG and Penzhorn B (2015). History and development of research on wildlife parasites in southern Africa, with emphasis on terrestrial mammals, especially ungulates. International Journal for Parasitology: *Parasites and Wildlife* 4, 50-70.
- ✓ MacDonald AS, Araujo MI and Pearce EJ (2002). Immunology of parasitic helminth infections. *Infection and Immunity* 70, 427-433.