First report to reserves - Investigating the parasites of black rhinoceros (*Diceros bicornis*)

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Abstract

Parasites impact wildlife survival and fecundity, and tolerance of management-induced stressors (e.g., translocation). They are, therefore, a concern in the management of endangered species, like rhinoceros, especially where species recovery depends on cross-continental translocation (i.e., reintroduction and restocking, IUCN 1987) and maximizing population vital rates. The intestinal and filarial nematode parasites of black rhinoceros (*Diceros bicornis*) are numerous, however their bio-geographic ranges, host-specificity and ecology, and longer-term impact on rhinoceros population vital rates are poorly understood. This study will investigate the differences in parasite abundance between populations of black rhino, and examine how parasites modify animal fitness on a population and individual scale. This will include investigating how parasites may affect the ecological carrying capacity of a reserve. The project will test fundamental ecological theories concerning what factors, such as host density, may affect parasite species abundance in these populations. Finally, historical translocations of wildlife provide a remarkable, albeit fortuitous experiment, to understand how parasites spread through a meta-population and affect post-release success.

Objectives

1. Quantify the abundance of three parasite groups within the black rhinoceros population.
2. Investigate how environmental, ecological and demographic factors affect parasite abundance within a host (black rhinoceros) population.
3. Investigate how management factors, such as the size, source and composition of the initial release cohort, affect the host-parasite relationship and so the future parasite abundance within a rhinoceros population.
4. Investigate whether parasite load affects post-release success.
5. Investigate the impacts of parasite load on black rhinoceros body condition, fecundity and mortality.
6. Investigate how differing parasites burdens may modify the estimated carrying capacity of a reserve.

Progress so far

The black rhinoceros population have now been successfully sampled, from a range of reserves in the Eastern Cape, KwaZulu-Natal and Limpopo. It was discovered that three

main groups of parasites can be identified from the fresh faeces of black rhinoceros. Two of these groups are nematodes; a small strongyle-type egg, likely to be *Kiluluma* spp, a large strongyle-type egg, likely to be *Khalia* sp. The third is a cestode tapeworm called *Anoplocephala gigantea*.

It has also been revealed that a surprisingly low number of fresh faecal samples are needed to give a good estimate of the mean and median intensity of infection in a population. Nine fresh faecal samples were collected and analysed from Maremani; a sufficient quantity of samples to accurately estimate the abundance of parasites there.

Table 1. Descriptive results of faecal egg counts of the three parasite groups from Maremani. See appendix for full results. EPG – eggs per gram.

	Prevalence	**Mean (EPG)**	**Median (EPG)**	**Var/Mean Ratio**
Large Strongyle	0	0	0	n/a
Cestode	44.4%	75	62.5	79.69
Small Strongyle	66.7%	66.67	50	58.98

Table 2. Descriptive results for all reserves sampled so far.

	Prevalence	**Mean (EPG)**	**Median (EPG)**	**Var/Mean Ratio**
Large Strongyle	82.3%	237.99	164.93	196.49
Cestode	87.3%	305.04	225.00	397.41
Small Strongyle	97.47%	2673.93	2405.93	774.09

Parasites are aggregated through a population. This means that a small proportion of hosts (in this case black rhinoceros) contain a large proportion of the parasite population. The var/mean ratio is a measure of the level of aggregation. The aggregated distribution of parasites means that the median and mean egg counts for a population have different biological meanings. Here the median faecal egg count represents the typical level of infection of a black rhino population. Where as the mean is representative of the total parasite abundance in the population (per rhino). The prevalence shows the proportion of black rhino that are infected with that parasite species.

The parasite prevalence and abundance within the black rhinoceros populations studied show remarkable variation. Across Limpopo there is a low abundance of all three parasite groups studied, and Maremani is not unique in seeming to lack the large strongyle group altogether. It is likely that the environmental conditions found in Limpopo are the cause of the low parasitic abundance found there, however this is only an initial hypothesis. The project is still ongoing and I hope to give a definitive answer to this question, along with details about whether parasites are beneficial or pathogenic to black rhinoceros in a report to you in November 2012.

Appendix 1: Full list of samples and results. Parasite numbers are in eggs per gram of faeces.

LS – Large Strongyles, SS – Small Strongyles, C – Cestode

Date			**BS**	**SS**	**C**
11/3/12			0	0	150
11/3/12			0	25	75
10/3/12			0	0	25
11/3/12			0	25	0
10/3/12			0	50	0
10/3/12			0	150	0
10/3/12			0	100	0
11/3/12			0	50	50
10/3/12			0	0	0