Notes and records

The effects of time of day on the prevalence of coccidian oocysts in antelope faecal samples

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Introduction

Relatively few studies have documented coccidian infection levels in free-ranging wild boids (e.g. Penzhorn, Knapp & Speer, 1994; Penzhorn, 2000; Waruiru et al., 1995), despite the fact that coccidia can be highly pathogenic in boids and are important causes of disease in domestic stock (Urquhart et al., 1996; Bowman, 1999). Much of the information currently available on the prevalence and intensity of coccidial infections in wild boids comes from studies focusing on gastrointestinal helminth distributions that also recorded the presence of coccidia. In most cases coccidial infections are diagnosed using coprological techniques, thus the true distributions of these parasites could be masked because of inadequate faecal sampling procedures not particularly suited to the study of coccidia specifically. This paper presents results suggesting that the time of day in which faecal samples are collected affects the prevalence rates of coccidia in three species of African antelope. These results are part of a larger study on gastrointestinal parasitism in African boids, and they highlight the importance of controlling for factors like sample collection time in such studies.

Materials and methods

Faecal samples were collected at the Mpala Research Centre, Kenya, between August 1999 and July 2000. During this period 455 samples were collected from impala (Aepyceros melampus), 157 from hartebeest (Alcelaphus buselaphus) and 30 from Thomson’s gazelle (Gazella thomsonii). Faecal samples were collected after an individual animal was seen defecating or after a group of animals left an area. Fresh samples were placed in a labelled plastic bag and transported to the laboratory for processing. Samples were usually processed the same day but in a few instances, the samples were stored at 4 °C and processed on the following day. Samples collected between 06:00 and 12:30 hours were designated as morning samples and those collected between 16:00 and 19:00 hours were designated as evening samples. The prevalence (percentage of samples infected) and intensity (oocysts per gram faeces [OPG]) of coccidia in each sample were determined using a modification of the McMaster faecal egg counting technique (MAFF, 1980), with saturated sodium chloride (specific gravity 1.2) used as the flotation solution. Because the distribution of OPG values was aggregated in each host population, values were log transformed for statistical analysis.

Results and discussion

Coccidian oocysts were more prevalent in samples collected in the afternoon in all three host species (Fisher’s exact test: hartebeest, \( \chi^2 = 12.941, df = 1, P = 0.0018 \); impala, \( \chi^2 = 10.798, df = 1, P = 0.0018 \); Thomson’s gazelle, \( \chi^2 = 6.887, df = 1, P = 0.0307 \); Table 1). However, despite a higher prevalence of coccidia in faecal samples collected later in the day, there was no significant difference in the mean number of oocysts (log [OPG + 1]) shed in the morning and afternoon by either hartebeest (ANOVA: \( F_{1,13} = 0.3, P > 0.1 \)), impala (\( F_{1,156} = 0.15, P > 0.1 \)) or Thomson’s gazelle (\( F_{1,4} = 0.38, P > 0.1 \)) (Fig. 1).

Temporal variation in oocyst prevalence has previously been found in birds (Boughton, 1937; Brawn & Hill, 1999), and is hypothesized to result from the periodic release of oocysts from host tissues (Boughton, 1937). After oocysts are passed out in a host’s faeces they undergo sporulation, a process during which each oocyst divides into infective sporocysts that can then be ingested by a new host. Successful sporulation depends on...
Table 1  The number of morning and evening faecal samples collected from three antelope species and the percentage of these samples infected with coccidian oocysts. Oocysts were more prevalent in evening samples during the time of day most appropriate to the objectives of the study.

<table>
<thead>
<tr>
<th></th>
<th>Morning samples (n)</th>
<th>% infected</th>
<th>Evening samples (n)</th>
<th>% infected</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hartebeest</td>
<td>146</td>
<td>18</td>
<td>11</td>
<td>64</td>
<td>0.0018</td>
</tr>
<tr>
<td>Impala</td>
<td>442</td>
<td>33</td>
<td>13</td>
<td>77</td>
<td>0.0018</td>
</tr>
<tr>
<td>Thomson's gazelle</td>
<td>23</td>
<td>4</td>
<td>7</td>
<td>43</td>
<td>0.0307</td>
</tr>
</tbody>
</table>

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References


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