Prevalence of Sarcocystis species in sheep and goats in Northern Nigeria

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Introduction

Infection of sheep and goats by Sarcocystis species is a cause of concern to the meat industry because it leads to carcass condemnation in many developed countries (4) especially where visible microscopic cysts are encountered (9, 12). Infection by macroscopic cysts in sheep has been shown experimentally to be transmitted by cats (11).

In addition, sheep and goats may also be infected with other species of the parasite which only form microscopic cysts in the musculature. Infection by such cysts has been shown to be transmitted by dogs (3, 5). Recent studies have shown that these microscopic cyst-forming species may cause acute and even fatal clinical diseases in sheep and goats, abortion in pregnant ewes and does, and significant reduction in weight gain and wool growth in young lambs and kids (3). The prevalence of infections by these microscopic cysts has been examined in several countries using a variety of techniques (2, 10). In contrast, no report on the prevalence of infection by microscopic cysts has been made in sheep and goats in Nigeria. The only documented report in Nigeria is the prevalence in dogs (1).

The present investigation was therefore carried out to determine the prevalence and abundance of the different types of Sarcocystis species occurring in sheep and goats in 3 States of Northern Nigeria : Bauchi, Plateau and Kaduna States.

Materials and Methods

Samples of diaphragm muscle (about 30 mg) and oesophagus (about 15 cm) were collected from 400 sheep and 400 goats slaughtered in abattoirs located in the 3 State capitals (Bauchi, Jos and Kaduna). These abattoirs receive animals from the neighbouring towns and villages in and around the States. The samples were each packed in a labelled polythene bag and transported to the laboratory in a cooler. They were stored at 4 °C until use.

Tissue samples were first briefly examined in the abattoir for the presence of macroscopic cysts. At the laboratory, they were further examined under the dissecting microscope. Later, the tissues were subjected to digestion using artificial gastric juice (1 % HCL-Pepsin solution (6). The digests were centrifuged at 200 g for 5 min and sediments checked for microscopic sarcocysts or bradyzoites. The sarcocysts seen and the cyst-wall thickness were measured with an ocular micrometer.

Results

Of the 400 sheep tissue samples (oesophagus and diaphragm), none had macroscopic cysts, while 36 were found to have microscopic sarcocysts (table 1). Out of the 36, all had cysts in the oesophagus while 22 had also cysts in the diaphragm (table III). The average measurement of sarcocysts ranged from 35.7 to 500 µm in length and the average cyst-wall measure was 2.4 µm (table II).

TABLE I Prevalence of Sarcocystis species in sheep and goats.

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Total number sampled</th>
<th>Number positive</th>
<th>Percentage positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>400</td>
<td>36</td>
<td>9</td>
</tr>
<tr>
<td>Goats</td>
<td>400</td>
<td>56</td>
<td>14</td>
</tr>
</tbody>
</table>

TABLE II Nature and species of sarcocysts from oesophagus and diaphragm of sheep and goats.

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Total number sampled</th>
<th>Number positive</th>
<th>Average cyst size (length) (µm)</th>
<th>Average cyst-wall size (µm)</th>
<th>Nature of cyst</th>
<th>Species of Sarcocystis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>400</td>
<td>36</td>
<td>35.7-500</td>
<td>2.4</td>
<td>Microscopic</td>
<td>S. tenezla</td>
</tr>
<tr>
<td>Goats</td>
<td>400</td>
<td>56</td>
<td>98-700</td>
<td>2.7</td>
<td>Microscopic</td>
<td>S. capricanis</td>
</tr>
</tbody>
</table>
In goats, 56 were positive for Sarcocystis cysts and all had cysts in the oesophagus, while only 30 of the 56 had cysts in the diaphragm (table III). The sarcocysts measured 98-700 μm in length and the average cyst wall measure was 2.7 μm (table II).

Discussion

The morphometric studies, using type of sarcocysts and size of cyst-wall, resulted in the detection of only one species of Sarcocystis in sheep and goat tissues examined. The oesophagus was found to contain more cysts than the diaphragm and the reason for this cannot be explained.

Microscopic cysts from sheep musculature was described by MOULE (8). The transmission studies performed later demonstrated that microscopic cysts from sheep and goats were infective to dogs (5, 7), whereas repeated attempts to infect cats were unsuccessful. Therefore, the microscopic species found in sheep were Sarcocystis tenella and those of goats Sarcocystis capracanis. This assessment is based on transmission to dogs, nature of cysts and size of cyst-wall.

The prevalence of infection by microscopic cysts was found to be 9 % in sheep and 14 % in goats. Higher levels of infection of 50-100 % have been reported in sheep and goats in other countries (3, 10). Infection by S. tenella and S. capracanis can cause severe and even fatal diseases in sheep and goats during the period of parasite merogonous proliferation prior to muscle cyst formation. This may result in high abortion and mortality rates (3). Since this is the first study in Nigeria, further investigations should be done to confirm the parasite species present using electron microscopes and also to determine the effect on small ruminant production. This is because adequate supply of meat to Nigerian population depends on a large extent on the considerable attention given to small ruminant production and therefore any factors that have a negative influence on this production should be brought under strict control.

TABLE III Prevalence of sarcocysts based on type of tissue.

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Type of tissue</th>
<th>Total number sampled</th>
<th>Number positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>Oesophagus</td>
<td>400</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Diaphragm</td>
<td>400</td>
<td>22</td>
</tr>
<tr>
<td>Goats</td>
<td>Oesophagus</td>
<td>400</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Diaphragm</td>
<td>400</td>
<td>30</td>
</tr>
</tbody>
</table>

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