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BOVINE BABESIOSIS IN NIGERIA: THE VECTORIAL CAPABILITY OF BOOPHILUS DECOLORATUS AND BOOPHILUS GEIGYI FOR BABESIA BIGEMINA AND BABESIA BOVIS

BY O. A. AKINBOADE and O. O. DIPEOLU *

EXPERIMENTAL TRANSMISSION
BABESIA BIGEMINA B. BOVIS BOOPHILUS DECOLORATUS B. GEIGYI CALF NIGERIA

SUMMARY: Boophilus decoloratus and B. geigyi which fed on a calf infected with mixed Babesia bigemina and B. bovis transmitted the parasites to clean calves. Parasitaemia occurred faster in the calf which became infected through B. decoloratus. There were also more parasites of B. bigemina than of B. bovis in the smears from the blood of the infected calves.

INTRODUCTION

Previous works on the incidence of babesiosis in Northern Nigeria (FOLKERS and KUIL 1967; FOLKERS, KUIL and PERIE 1967; LEEFLANG 1972) and in the whole of Nigeria (DIPEOLU 1975a) agreed that the species infecting cattle are Babesia bigemina and B. bovis. DIPEOLU (1975b, c) recorded the distribution of the suspected vectors — Boophilus decoloratus and B. geigyi in the country. Only B. decoloratus had been shown to be a vector of B. bigemina in Nigeria (AKINBOADE), DIPEOLU and ADETUNJI 1981) while B. geigyi was reported to be a vector of B. bovis (AKINBOADE and DIPEOLU 1980). In this investigation, an attempt was made to transmit both B. bigemina and B. bovis to calves by both Boophilus decoloratus and B. geigyi.

MATERIALS AND METHODS

Three white Fulani calves (A, B, C, aged 9-12 months) were used in this study. Calves A and B were free of blood and ectoparasites;
calf C had mixed infection of *B. bigemina* and *B. bovis*. Each calf was kept in a separate pen at the University Animal Hospital and given a regular feeding regime.

About 200 clean, laboratory-bred, unfed adult *B. decoloratus* and 200 *B. geigyi* were fed on calf C by enclosing each group in a bag secured over the ears. After 2 days, each bag was removed and the ticks which had attached to the ears were carefully removed and replaced in their respective bags. The bag containing adult *B. decoloratus* was then secured on one ear of Calf A; the bag containing *B. geigyi* was attached to one ear of calf B; the bags were left undisturbed for 5 days. Daily rectal temperatures were taken and smears were made of blood from the jugular vein of each calf for 21 days. The smears were fixed in methanol, stained with Giemsa and examined for *Babesia* parasites. The number of parasites per available red cells on two hundred fields on each microscope slide was expressed as percent infection.

**TABLE I : Infection post tick attachment (%) :**

<table>
<thead>
<tr>
<th>DAYS</th>
<th>0</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Temp. °C of Calves A &amp; B</td>
<td>38.0</td>
<td>38.1</td>
<td>38.6</td>
<td>38.2</td>
<td>37.9</td>
<td>38.0</td>
<td>38.4</td>
<td>39.1</td>
<td>39.0</td>
<td>38.6</td>
<td>38.2</td>
<td>38.2</td>
</tr>
<tr>
<td>% Parasitaemia Calf A</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>1.5</td>
<td>2.6</td>
<td>4.0</td>
<td>3.5</td>
<td>3.5</td>
<td>1.5</td>
<td>1.0</td>
<td>0</td>
</tr>
<tr>
<td>% Parasitaemia Calf B</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
<td>3.0</td>
<td>3.8</td>
<td>1.6</td>
<td>1.6</td>
<td>1.0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>% Parasitaemia Calf C</td>
<td>6.0</td>
<td>6.0</td>
<td>5.6</td>
<td>4.0</td>
<td>3.8</td>
<td>3.5</td>
<td>3.0</td>
<td>3.0</td>
<td>2.6</td>
<td>2.6</td>
<td>1.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**RESULTS**

Table I and Fig. I show that both *B. decoloratus* and *B. geigyi* transmitted both *B. bigemina* and *B. bovis* to the calves. Calves A and B as shown by studying the morphology of the *Babesia* in the smears were each infected by mixed infection of the two *Babesia* species. In each smear, there were more parasites of *B. bigemina* than of *B. bovis*.

*B. decoloratus* transmitted *Babesia* infection to calf A faster than *B. geigyi* did to calf B but the infection subsided in each calf at about the same time (Fig. I). There was no marked temperature rise in these calves except on days 12-16, which coincided with the parasitaemia recorded in each calf.

**DISCUSSION**

Each of the two *Boophilus* species tested is capable of transmitting *B. bigemina* and *B. bovis*. That the parasitaemia first appeared in calf A on day 7 while that in calf B appeared on day 10 probably means that *B. decoloratus* transmits babesial infection to bovines earlier than *B. geigyi* does. The peak of infection in Calf A was also higher than in calf B; it occurred on day 12 compared to day 16 in calf B. This difference in peak periods may be due to the initial difference in days when parasitaemia first came up in the respective calves. It may also be due to the individual physiological body reaction of each which might also affect the general level in each.

The removal of the ticks from the ear of calf C to those of calves A and B did not adversely affect the results since the ticks transmitted the infections afterward. The findings of ABRAMOV (1955) and STILLER and FRERICHS (1978) that interrupted feeding on transmitting tick stages leads to infection of more than one host in *B. equi* and *B. caballi* respectively, are also true of the vectors of *B. bigemina* and *B. bovis*. There were also more numerous *B. bigemina* than *B. bovis* parasites in the mixed infection probably because the former has a greater multiplication than the latter and the incubation period of the latter is also longer (LEVY personal communication). The presence of both *Babesia* species in cattle is advantageous to the animals because certain level of immunity is built up in each animal affected resulting in animal resistance to further *Babesia* infection.

An endemic stability is thus maintained in the animals with little damage to the erythrocytes and fairly constant packed cell volume (PCV).
Fig. 1: Percent infection post tick attachment.

REFERENCES


