

Experimental transmission of *Babesia bigemina* in sheep using infective larval tick of *Boophilus decoloratus*

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RÉSUMÉ

Transmission expérimentale de *Babesia bigemina* à des moutons à l'aide de larves infectantes de la tique *Boophilus decoloratus*

A l'occasion d'une transmission expérimentale de *Babesia bigemina* à 7 moutons neufs en utilisant des larves infectantes de *Boophilus decoloratus*, l'auteur a observé que 5 d'entre eux ont été infectés par le parasite qui a disparu de leur sang 4 semaines environ après la mise en place des larves, ce qui permet de penser à une infection seulement temporaire.

INTRODUCTION

Babesia bigemina is known to be transmitted in Nigeria by *Boophilus decoloratus* which parasitises cattle (DIPEOLU, 1975). In another survey on ectoparasites of cattle, sheep and goats, DIPEOLU (1975) found out that *Boophilus decoloratus* also parasitises sheep. Although *Babesia motasi* and *B. ovis* are the *Babesia* species found in sheep in Nigeria, *Babesia bigemina* has not been demonstrated or reported in the blood of sheep.

CALLOW and HOYTE (3) in Australia made successful attempts at elucidating the mode of infection of *Boophilus microplus* with strains of *B. bigemina* and the transmission of the parasite to the bovine.

CALLOW (2) was also able to demonstrate experimental infection of *B. bigemina* in the blood of sheep both by inoculation of cattle blood into sheep as well as by feeding of the larvae of *B. microplus* on the inoculated cattle. The aim of this paper therefore is to show whether *B. bigemina* can be demonstrated in the blood of sheep using infective larval tick of *Boophilus decoloratus*.

MATERIALS AND METHODS

Seven West African Dwarf Sheep were used for this transmission experiment. They were examined and treated for blood and helminth parasites. It was also ensured that there were no ectoparasites on them. After about two weeks when their blood became negative for parasites, they were infected with infective larvae of *Boophilus decoloratus* collected from trade cattle at the Bodija abattoir, Ibadan, 1 000 larvae were put into each of the seven scrotal bags which were tied round the scrotum of each animal. These larvae used were among a batch of larvae used to produce infection in a clean splenectomised calf.

The animals were kept in their pens fed daily and left for about 2 weeks.

Blood smears were however made daily from each animal to detect the presence or absence of *B. bigemina* in the blood of the sheep. Two smears were made from each animal daily and this was done for about one month. Each smear was fixed with methanol for 2 min., air-dried and stained with Giemsa. All the smears were then examined in the laboratory under a light microscope.

RESULTS

TABLE 1 showing in which animal transmission by larvae had taken place

Animal N°	N° of infective larvae fed	<i>B. bigemina</i> transmission	Day of detection in blood	Day of disappearance from blood
T 19	1 000	+	13th	25th
A 12	1 000	+	12th	26th
P 8	1 000	+	16th	28th
B 5	1 000	-	-	-
B 4	1 000	+	14th	28th
F 1	1 000	-	-	-
F 29	1 000	+	17th	29th

+ - low level parasitaemia in blood ; ++ - high level parasitaemia in blood ;

- - no parasite in blood.

DISCUSSION

From the results in table 1, it has been established that *B. bigemina* infection can be experimentally transmitted using infective larvae of *Boophilus decoloratus*. This should be expected since cattle tick *Boophilus decoloratus* has been found to be one of the most predominant ectoparasites of sheep and goats (4).

Five out of the seven animals used were shown to carry the infection two weeks post attachment of the larvae and this infection appears to wane about four weeks post larval attachment. This probably shows that the infection is transitory. No reason may yet be adduced to this behaviour but it might be that the blood parasites had been re-absorbed by the ticks which had now become adults and have started feeding on the animals. CALLOW (2) had shown a correlation between the infection with *B. bigemina* of the ticks maturing on sheep and the infectivity of the sheep's blood from the time of collection of the ticks on the animal and had concluded that infection of the tick occurs as from the time it begins to mature.

However, another point worthy of consideration is the reaction of the hosts' antibody to these parasites. The non-appearance of these parasites in the blood after about four weeks might be due to these antibodies which had reacted and cleared the parasites away from the blood stream since the level of the parasitaemia was low.

It is also interesting to note that parasites were detected in the blood at the time the larvae were moulting into nymph. This probably

confirms the established fact that *Boophilus* larvae lose their infectivity at nymphal stage and this is recovered when they become adult ticks.

B5 and F1 were negative to *B. bigemina* transmission. The reason for this is not quite clear but may also have to do with hosts' antibody or probably that the majority of the larvae have lost their infectivity.

Hitherto, *Babesia* organisms have been thought to be host specific. This successful transmission and that of CALLOW (2) have disproved this idea. *B. bigemina* has been found to grow in non-bovine hosts while the infective ticks were growing on them.

The disappearance of *B. bigemina* in the blood four weeks after has been suggested to be probably due to reabsorption of this infective organism by the maturing tick. This confirms the findings of CALLOW (2) when he concluded that ticks carrying *B. bigemina* often fail to become cleansed of this infection after having fed on a sheep or a goat. The continued infectivity of ticks following their growth in non-bovine host like the sheep could be as a result of the fact that piroplasms can be transmitted hereditarily from one generation to the next without passing through the vertebrate host as postulated by BRUMPT (1) and that the piroplasms pass from the tick, undergo development in the non-bovine host and re-infect the tick (2).

It can therefore be concluded that though there is low level infection of *B. bigemina* in the sheep blood, *B. bigemina* can be transmitted successfully into sheep using infective larvae of *Boophilus decoloratus*.

SUMMARY

In an experimental transmission of *Babesia bigemina* into seven clean sheep using infective larvae of *Boophilus decoloratus*, it was observed that five of the seven animals came down with *Babesia* infection two weeks post larval attachment. The infection however wanes about four weeks after the larval attachment.

RESUMEN

Transmisión experimental de *Babesia bigemina* a carneros mediante larvas infectantes de la garrapata *Boophilus decoloratus*

Durante una transmisión experimental de *Babesia bigemina* a siete carneros indemnes al utilizar larvas infectantes de *Boophilus decoloratus*, el autor observó que cinco de ellos se infectaron con dicho parásito que desapareció de su sangre cerca de cuatro semanas después de la introducción de las larvas, lo que permite pensar en una infección sólo temporaria.

BIBLIOGRAPHIE

1. BRUMP (E.)
sion experiments using *B. bigemina*, *Theileria mutans*, *Borrelia*, sp. and the cattle tick, *Boophilus microplus*. *Aust. vet. J.*, 1961, **37** : 381-390.
2. CALLOW (L. L.). *Babesia bigemina* in ticks grown on non-bovine hosts and its transmission to these hosts. *Parasitology*, 1965, **55** : 375-381.
3. CALLOW (L. L.) and HOYTE (H. M. D.). Transmis-
4. DIPEOLU (O. O.). The incidence of ticks of *Boophilus* species on cattle, sheep and goats in Nigeria. *Trop. anim. Hlth. Prod.*, 1975, **7** : 35-39.
5. DIPEOLU (O. O.).