

THE PREVALENCE OF *THEILERIA* SCHIZONTS IN DOMESTIC RUMINANTS IN NIGERIA

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INTRODUCTION

The first report of the occurrence of pathogenic species of *Theileria* in Nigeria was made by the author (Dipeolu, 1975a) who identified *Theileria annulata* in the blood smears of 1.1% of the 1175 slaughtered trade cattle and *T. hirsi* in 2% of the 557 slaughtered small ruminants at various veterinary control posts and abattoirs in the country. This had been confirmed by Oladosu, *et al* (1974) who reported four clinical infections of *T. annulata* in exotic and indigenous cattle at the Teaching and Research farm of the University of Ibadan. These reports had aroused speculations on the prevalence of the disease in ruminants, the evaluation of its limitation to animal production and the epizootiology of the disease in Nigeria. This investigation was designed to answer some of these questions.

MATERIALS AND METHODS

The investigation covered a period of 18 months and was conducted in two phases. The first phase took place between January and December 1976, at the "Demonstration abattoir" of the Ministry of Agriculture and Natural Resources. This abattoir is located at Ibadan and the cattle purchased from various Fulani herdsmen all over the country by the Ministry officials are slaughtered there for sale to the public
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after thorough meat inspection. The abattoir was visited once a week and the same routine was adopted throughout the investigation. At slaughter, each animal was thoroughly examined for the presence of ticks. When found, they were preserved in 10% formalin until identified in the laboratory. Three blood smears were then made and these were followed by three lymph node smears from the needle puncture of the suprascapular lymph node. The smears were clearly labelled, fixed in methanol stained in Giemsa stain and examined in the laboratory under oil immersion. Although all blood parasites were recorded, special attention was devoted to *Theileria* species. When a blood smear was positive for *Theileria* parasites, the morphological forms in 1,000 parasitized erythrocytes were ascertained and the proportions which were rodlike, ringform, comma form and anaplasma-like were recorded. The corresponding lymph node smear was then inspected and schizonts, when present, were recorded as "numerous," "moderate", or "scanty." Ticks were identified according to standard taxonomic keys of Campbell (1970) and Hoogstraal (1959). The origin of all the cattle positive for *Theileria* parasites was obtained from the record of the Demonstration abattoir.

The second phase took place at the public abattoir in Ibadan. On various occasions between January and June 1977, lymph node smears were made from 20

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randomly selected slaughtered trade cattle and from 20 randomly selected slaughtered sheep and goats. These were stained with Giemsa and subsequently examined for the presence of *Theileria* parasites.

RESULTS

Of the 118 cattle examined in the demonstration abattoir, only 6 (5.08%) showed numerous schizonts in the lymph nodes (Table 1). Twenty one (21) of the 320 slaughtered trade cattle examined at the public abattoir possessed numerous schizonts in the lymph node smears. Among the 220 sheep and goats examined in the same venue, schizonts were seen in lymph node smears of 14 (6.36%). Analysis of the morphological forms of the piroplasms in the corresponding blood smears of the 6 infected cattle at the demonstration abattoir showed a

predominance of ring forms over the rod, comma and anaplasma-like forms (Table 2). This indicated infection with *T. annulata* (Barnett, 1968). Of these 6 positive cases, only two had pure infection with *T. annulata*; the other 4 had mixed infections with trypanosomes or *Eperythrozoon* species. Two (2) of the cattle originated from Niger Republic, 1 from Chad Republic and the remaining 3 from Kano in Nigeria. They were all brought to Ibadan by lorries. Ticks were found in only 2 of the 6 infected cattle and they were those from the Niger Republic. One of them had *Hyalomma impeltatum* only while the other possessed this tick species together with *Amblyomma variegatum* and *Ixodes cavipalpus*. As shown further in Table 2, the blood smears of 7 heads of cattle diagnosed as infection with *T. mutans* showed greater numbers of rod and comma forms and no schizont could be found in their corresponding lymph node smears.

TABLE I
Incidence of *Theileria* schizonts in the lymph nodes of slaughtered ruminants at Ibadan

Place of Investigation	Animal species	Total No. Examined	No. showing Schizonts in smear	Percent
Demonstration abattoir	Cattle	118	6	5.08
	Cattle	320	21	6.56
Public abattoir	Sheep and Goats	220	14	6.36

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TABLE 2
Analysis of blood and lymph node smears of cattle infected with *T. annulata* and *T. mutans*

Blood Smear Analysis										
Code No of Cattle	Origin	Total No. of Para- sites in 1000 Erythro cytes	Percent Ring	Percent Rod forms	Percent Comma forms	Percent Anaplasma forms	Other Parasites	Ticks found lymph node	Schizonts in lymph node	Probable diagnosis
	Kano	1270	78	10	8	4	—	—	Numerous	Theileria annulata
102	Chad Republic	1375	81	13	5	1	Eperythrozoon spp.	—	"	"
A13	Kano	1366	90	8	1	1	T. vivax T. congolense	—	"	"
104	Niger Republic	1475	72	16	10	2	T. congolense T. vivax	A. variegatum T. cavipalpus H. impeltatum	"	"
48	Niger Republic	1161	79	10	10	1	—	H. impeltatum	"	"
M6	Kano	1268	89	8	2	1	B. bovis Eperythrozoon spp.	—	Moderate	"
113	Kano	1942	16	51	32	1	T. vivax	—	"	Theileria mutans
91	Shaki	1936	12	60	27	1	—	—	"	"
213	Sokoto	1871	24	50	2/	1	—	—	"	"
59	Jos	1910	18	30	50	2	—	—	"	"
69	Kano	1892	20	55	23	2	T. congolense	—	"	"
M1	Kano	1791	19	61	19	1	T. vivax T. congolense	—	"	"
M5	Sokoto	1888	30	50	18	2	—	—	"	"

*All cattle were indigenous breeds.

Other ticks found in the slaughtered cattle but not recorded in Table 2 are *Rhipicephalus ziemani*, *R. sanguineus*, *R. simus senegalensis*, *Boophilus decoloratus* and *H. truncatum*. Other parasites found in the blood smears of the cattle examined at the Demonstration abattoir are *Trypanosoma vivax* (14%), *T. congolense* (12%), *Babesia bigemina* (6%), *B. bovis* (5%), *Eperythrozoon* species (21%), *Anaplasma marginale* (3%) and only one case each of *Haemobartonella bovis* and microfilaria of *Onchocerca bovis*. It was observed that there was a correlation between the degree of parasitaemia of *T. vivax* and *T. congolense* and their appearance in the corresponding lymph node smear. Although all the 16 instances of infection with *T.*

vivax showed the trypanosomes in their blood, only in 8 with moderate (50—100 trypanosomes per 200 fields) to heavy (100 trypanosomes per 200 fields) infection were trypanosomes found in the corresponding lymph node smears. Similarly for *T. congolense*, in only 4 cases with moderate to heavy parasitaemia were trypanosomes seen in the corresponding lymph nodes; trypanosomes were not seen in the lymph node smears of the 6 others with low parasitaemia in the blood smear.

DISCUSSION

This investigation provides convincing proof of the presence of *T. annulata* infection in Nigeria cattle. The predominance of the ring forms in the

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blood smears and the numerous schizonts in the corresponding lymph node smears indicate that the six heads of cattle at the Demonstration abattoir were carrying *T. annulata* infection (Barnett, 1968); it can be assumed that the trade cattle in the public abattoir with schizonts in their lymph node smears also possessed this parasitic infection although there were no blood smears to confirm this. Although *T. mutans* which is normally non-pathogenic and morphologically indistinguishable from *T. annulata*, could, in exceptional cases, present a similar picture, it will not show such a preponderance of ring forms. Hénning (1949) stated that the percentages of rod shaped and ring form in *T. mutans* are 45% and 35% respectively while in *T. an-*

nulata, they are 20-30% and 70-80% respectively. Similarly, the overwhelming occurrence of the ring forms and the absence of leucopenia in the lymph node smears rule out the possibility of *T. parva* infection.

This is the first time in Nigeria that such a diagnosis through blood smears is being backed up by the lymph node smears. The few workers who had conducted short term surveys on this aspect in Nigeria (Folkers and Kuil, 1967; Folkers, *et al*, 1970) based their diagnosis only on blood smear morphology and subsequently reported only *T. mutans*. This had led to the confirmation of parasitology text book statements that *T. annulata* exists only in the Middle and Far East, North Africa, India, Southern Europe and the U.S.S.R.

Although Nigeria can no more be said to be absolutely free of a theilerial pathogen of cattle, it appears that the incidence is relatively low. In view of the pathogenicity of *T. annulata* infections, a detailed study of the epizootiology of the infection in Nigeria is essential. One of the questions to be answered is whether the parasite is exotic and only gained access to the country through imported

stock — as reasoned for a report of *T. annulata* infection in cattle in East Africa by Barnett, *et al* (1960) — or whether it is indigenous, in which case one would expect reservoir hosts to be present in the country. Although clinical theileriosis due to *T. annulata* was reported in three exotic cattle imported into Nigeria from the Federal Republic of Germany (Oladosu *et al*, 1974), there was no evidence that the infection was acquired in the country of origin. Thousands of cattle still cross into Nigeria every year from the Niger and Chad Republics and these countries share common borders with some North African Countries in which the disease is believed to be prevalent. There is therefore a distinct possibility of introduction of this parasite into Nigeria through cattle migration from her northern neighbours. This argument is buttressed by the fact that three of the six infected cattle in this investigation originated from Niger and Chad Republics.

The uncertainty of the source of infection with *T. annulata* does not however becloud the certainty that the vector is scarce in Nigeria. This parasite is believed to be generally transmitted by ticks of *Hyalomma* species. Six species of this genus had been recorded in Nigeria (Dipeolu, 1975b) and *H. impeltatum*, the only species recorded on two of the infected cattle in this investigation, was the least in quantity. Muhammed (1974) also regarded this species as scarce in Nigeria although indigenous to the Sudan vegetation zone. It appears therefore that *H. impeltatum* may be the vector or *T. annulata* in Nigeria and the low incidence of the infection may be due to the scarcity of the vector in the country. If *H. rufipes* and *H. truncatum* which had been shown to be very numerous in Nigeria (Dipeolu, 1975b), were the vectors, the incidence of the disease should have been higher and the presence of the parasite could have been recognized before now.

Like *T. annulata*, the pathogenic *Theileria* species of small ruminants, *T. hirci*, was believed to be absent in West Africa. The recent report of Dipeolu (1975a), however, confirmed the findings of Pabs-garnon and Foley (1974) of the presence of this species in the small ruminants of West Africa. Their Work suggests further that the parasite was introduced into Sierra-Leone from the sahelian region. Since there had been an influx of various breeds of sheep and goats into Nigeria from many sahelian countries, the possibility of the infection being exotic exists.

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