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Source: Journal of Wildlife Diseases, 23(2) : 211-214

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-23.2.211>

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HEARTWATER INFECTION (COWDRIOSIS) IN A SITATUNGA (*TRAGELAPHUS SPEKEI*) IN NIGERIA

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ABSTRACT: *Cowdria ruminantium* was isolated from a natural infection of heartwater in a captive sitatunga (*Tragelaphus spekei*) which died after a short illness in Jos Zoo, Nigeria. The isolate killed laboratory mice in a shorter period of time than did isolates of *C. ruminantium* recovered from natural cases in cattle. This is the first confirmed case of heartwater in a captive wild ruminant in Nigeria, where the disease is endemic.

Key words: Heartwater infection, cowdriosis, *Cowdria ruminantium*, sitatunga, *Tragelaphus spekei*, Nigeria, case report.

INTRODUCTION

Heartwater (cowdriosis) is an African disease of ruminants, transmitted by ticks of the genus *Amblyomma*, and caused by the rickettsia, *Cowdria ruminantium*. The disease has been diagnosed also in the Caribbean islands (Uilenberg, 1983; Uilenberg et al., 1983). It is still relatively neglected even in many African countries where it occurs and causes mortality in sheep, goats and cattle. In Nigeria the disease is endemic and, because exotic breeds of ruminants in which overt disease is a problem are imported into the country for dairy farming purposes and upgrading of the local stock, interest in the disease has seen a renewal by the works of Isoun et al. (1974), Ilemobade (1976) and Synge (1978, 1980). Although several species of wild Bovidae living in the endemic areas can be infected, a review of the literature has not shown any documented case of the disease in wildlife in Nigeria either free or restricted in Zoological gardens. The purpose of this paper is to record a recent case of heartwater in a captive sitatunga in Jos Zoo, Nigeria.

MATERIALS AND METHODS

An adult male sitatunga, the only of its kind in the Jos Zoo, was noted to be recumbent, trembling, with infestations of fleas and ticks, anemic, frequently coughing and to have slight

diarrhea. The animal was obtained as a calf from the wild near Gongola, Nigeria in 1984 and had been in captivity for nearly 1 yr. It was dewormed with fenbendazole (Panacur, Hoechst U.K. Limited, Walton Manor, England) orally and dipped in Asuntol solution (Bayer, Leverkusen, Federal Republic of Germany) and given Myofer Tenophosphan (Bayer) an iron injection intramuscularly on 22 July 1985. On the morning of 25 July 1985, the animal was found dead and the carcass was submitted for post-mortem examination.

Lung and brain tissues were fixed in 10% formalin, embedded in paraffin, sectioned at 6 μ m, and stained with hematoxylin and eosin for histopathological examination. In addition, brain sections were fixed in castenada and stained with Giemsa.

Smears were made from the brain cortex (grey matter), cerebellum and cerebrum according to the method described by Leeflang (1972) and fixed in methanol and stained with Giemsa (Purchase, 1945). The stained smears were washed in tap water for 15 min and areas containing networks of capillaries located and examined with an oil immersion objective.

Brain material was inoculated intravenously into white Swiss laboratory mice and the spleens of dying mice were examined for *Cowdria ruminantium* after methanol fixation and staining with Giemsa.

Fecal samples from the large and small intestine and abomasal contents were examined for helminths and eggs, respectively, using methods described by Soulsby (1968).

Heartblood, lung, liver, spleen and brain as well as the bronchial and mesenteric lymph nodes, feces and bile were streaked onto sheep blood agar and MacConkey agar (Oxoid Ltd., Basingstoke, England), and feces and bile into

selenite broth. The plates were incubated aerobically and anaerobically at 37 C for 48 hr. Bacteria were regarded as significant only when isolated in pure culture or as the predominant organism. Routine cultural procedures were used for identification (Carter, 1975).

RESULTS

The carcass was emaciated. It had ticks identified as *Amblyomma variegatum* in large numbers in the ears, and on the scrotum, dewlap and brisket. Significant findings included accumulation of fluid in the pericardial sac, edema of the lungs, froth in the respiratory passages, congestion of the liver, enteritis and congestion of brain vessels. The abomasal mucosa was hyperemic and there were petechial hemorrhages in the serous membranes.

Histologically, the liver and lung sections showed accumulation of white cells in small blood vessels and perivascular and interstitial cellular infiltration. Focal necrosis of blood vessels, edema, hemorrhages and necrotic areas and focal necrosis of the granular layer of the cerebellum were seen in the brain.

Microscopic examination of the stained brain smears showed numerous groups of rickettsia-like organisms which appeared as reddish purple to blue in the endothelial cells of the brain capillaries. Both small forms (reddish purple) and large forms (blue) were seen in the various portions examined. Also brain sections fixed by Castaneda's procedure and stained with Giemsa showed numerous blue organisms (rickettsia) around the red nuclei and protoplasm of the brain cells.

A count of 2,000 strongyle eggs per gram of fecal sample was made from the feces and abomasal contents. No significant bacteria were cultured from the organs, bile and heartblood.

Some of the inoculated mice died 3 days postinoculation at first passage and *Cowdria ruminantium* was identified in spleen and liver smears.

DISCUSSION

Naturally contracted fatal heartwater has been reported in few wild bovids, mostly in South Africa. The disease has been reported in eland (*Taurotragus oryx*) (Young and Besson, 1973) and in springbok (*Antidorcas marsupialis*) (Neitz, 1944). Recent attempts to experimentally infect some captive wild ruminants with the Ball 3 strain failed (Gradwell et al., 1976). Captive impalas (*Aepyceros melampus*), blue wildebeest (*Connochaetes taurinus*), a kudu (*Tragelaphus strepsiceros*), a buffalo (*Syneerus caffer*), a giraffe (*Giraffa camelopardalis*) and a domestic sheep living with these animals were all exposed to the strain of *C. ruminantium*. The sheep contracted heartwater; none of the other animal reacted. Wild Bovidae and Cervidae exotic to Sub-Saharan Africa are known to contract fatal heartwater (Young and Besson, 1973; Poudelet et al., 1982).

In Nigeria, signs of what appeared to be heartwater had been recognized by pastoralist cattle owners as "Kabowa," meaning trembles (Anonymous, 1934), long before the first confirmatory diagnosis of the disease was made in sheep at Vom stock farm in 1930 (Hall, 1931). However, the disease has been diagnosed rarely in either captive or wild animals. This case appears to be the first documentation of heartwater in a non-domesticated ruminant in the country.

It is noteworthy that of the various wild Bovidae in captivity including duikers (*Cephalophus rufilatus*), oribis (*Ourebia ouribi*), and buffalo (*Syneerus caffer*), only the sitatunga died of heartwater. Heartwater has been implicated, without proof, in mortality of bushbucks (*Tragelaphus scriptus*) in South Africa (Henning, 1956), but Curasson and Delpy (1928) were unable to transmit the disease to bushbuck (*Tragelaphus scriptus*) and duiker. Gradwell et al. (1976) failed to produce the disease in some captive ruminants including a buffalo. The evidence for suscepti-

bility of only the sitatunga among other wild bovids probably suggests species susceptibility to the agent of heartwater. Inoculation of the sitatunga isolate into white Swiss mice showed that it killed the mice within 3 days, a shorter period in comparison with isolates from cattle dying naturally from the disease in a separate outbreak.

Jos Zoo is located in the heart of the city and removed from contact with cattle, sheep and goats which may harbor the vector of heartwater. Consequently possible cross infection from domestic ruminants through the vector was ruled out.

Amblyomma variegatum is the most important vector of the disease. It has a wide distribution in Nigeria (Mohammed, 1974). There is no evidence of adaptation of local heartwater strains to local *Amblyomma* spp. vectors and *C. ruminantium* does not lose its capability of being biologically transmitted by ticks even after numerous serial mechanical passages in mammals (Uilenberg et al., 1983). However, the agent was not looked for in the various stages of the tick seen on the carcass of the sitatunga. The case was considered to have been transmitted by *Amblyomma variegatum* found on the animal.

The role of wild ruminants as possible reservoirs of the agent of heartwater is unknown and until now it has been assumed that wild ruminants probably die of the disease in Nigeria. This case confirms natural susceptibility of sitatunga to the disease. Zoo veterinarians should consider heartwater in exotic ruminants from endemic areas or captive ruminants in zoos in endemic areas in the differential diagnoses of acute diseases causing mortality in these hosts.

ACKNOWLEDGMENTS

We are grateful to the staff of Parasitology Division, National Veterinary Research Institute in Vom for technical assistance. We also thank the Director, National Veterinary Research

Institute in Vom for permission to publish the finding.

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Received for publication 9 October 1985.