INVESTIGATION OF THE
IN VOLVEMENT OF THE DOMESTIC
CAT IN THE CYCLIC
TRANSMISSION OF CAPRINE
BESNOITIA

BY

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ABSTRACT

This study covers various aspects of coccidia of the domestic cat under natural and experimental conditions and the cat’s involvement in the cyclic transmission of caprine Besnoitia.

In a preliminary study on natural coccidian infection in cats around Kabete, fifty faecal samples examined revealed oocysts of four of the five known genera, Isospora, Sarcocystis, Toxoplasma and Besnoitia. Mixed and monospecific infections were observed in 46% and 38% of the samples respectively, while 16% had no infection. Oocysts of Isospora felis were the largest and measured on average 42.4 by 34.0 μm (n = 50). They were also the most frequent (66%) followed by Isospora rivolta (44%). Oocysts of I. rivolta measured 25.2 by 23.2 μm on average (n = 50). Free sporocysts of Sarcocystis muris were recovered in 4% of the samples and measured on average 11.0 by 7.9 μm (n = 50). Toxoplasma gondii oocysts were found in 12% of the samples and measured on average 12.0 by 10.3 μm (n = 50). Besnoitia wallacei oocysts were recovered in cat faeces for the first time in Kenya and occurred in 4% of the samples. They measured on average 16.6 by 14.5 μm (n = 50).

Rats, mice and rabbits orally infected with a mixture of Toxoplasma and Besnoitia oocysts developed the characteristic tissue cysts. Toxoplasma cysts in the brain of mice were spherical and measured 22.9 by 18.6 μm on average (n = 20). Spherical to ovoid cysts of Besnoitia wallacei, with the characteristic thick and PAS positive wall were seen in tissues of rats, mice and rabbits. In mice they measured 208.5 by 164.1 μm on average (n = 25). This observation indicated that Toxoplasma and Besnoitia are present around Kabete.
Endogenous stages of Besnoitia wallacei recovered from one of the cat faecal sample were studied in 13 other cats. The cats were fed on infected mice and rat tissues and serially sacrificed at one to two day intervals for 16 days. Asexual and sexual stages were seen between day 6 and 16 of infection. Microschizonts measuring 22.6 by 14.7 μm (n = 2) were seen in epithelial cells of the small intestines while macroschizonts occurred in the lamina propria of the small intestines and the liver during this period. Macroschizonts in the lamina propria measured 66.6 by 50.3 μm (n = 50), while those in the liver were 70.9 by 55.0 μm (n = 5). Sexual stages were demonstrated in epithelial cells of the small intestines only. Macrogametocytes measured 9.1 - 14.4 by 5.0 - 14.2 μm (n = 15). Macrogametes measured 10.1 - 15.6 by 7.2 - 9.6 μm (n = 15) and microgametocytes measured 9.1 - 14.0 by 6.2 - 11.8 μm (n = 10). Therefore the development of Besnoitia wallacei in the cat involves asexual stages in the intestines and the liver and sexual stages in the intestines.

Twenty cats were investigated for their involvement in the cyclic transmission of the Besnoitia species affecting goats in Kenya. Eight cats were fed heavily infected goat tissues, two cats were orally inoculated with 1 x 10⁶ Besnoitia bradyzoites from the same goats and ten cats were under natural or artificial stress and fed on infected goat tissues or inoculated with 1 x 10⁶ Besnoitia bradyzoites. None of the above cats produced oocysts in their faeces for 30 days post-infection. This indicated that the domestic cat plays no role in the transmission of the Besnoitia species affecting goats in Kenya.

Laboratory mice and rats were investigated for their role in transmission of the Besnoitia species affecting goats in Kenya. In ten mice and ten rats injected
intraperitoneally and ten mice and ten rats injected subcutaneously with bradyzoites from goat tissues, neither tissue cysts nor tachyzoites could be demonstrated. Six cats fed on their carcasses did not produce _Besnoitia_ oocysts in their faeces for 30 days post-infection again indicating that mice and rats are not involved in the transmission of this _Besnoitia_ species.

The infectivity of _Besnoitia wallacei_ oocysts to goats was investigated. Five, 9-12 month-old goats orally inoculated with approximately $1 \times 10^6$ sporulated oocysts did not develop a clinical disease. Microscopically, mononuclear cell infiltration was observed in the lungs and liver, but cysts and tachyzoites could not be demonstrated. Two of the three cats fed on tissues from these goats produced oocysts of _Besnoitia wallacei_ on day 12 of infection proving that the goat is a poor intermediate host for _Besnoitia wallacei_.