



## RESEARCH COMMUNICATION

# An epidemic of Besnoitiosis in cattle in Kenya

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### ABSTRACT

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A total of 17 head of cattle presenting with typical "Elephant skin disease" were isolated from the rest of the herd within a beef ranch for further clinical observation.

On physical examination, all the animals had characteristic sclero-conjunctival cysts of *Besnoitia besnoiti*. In addition, some of the animals had characteristic skin nodules on the legs, ears and back. Histological examination of skin sections revealed typical large *Besnoitia* cysts. Microscopic examination of crush preparations of skin scrapings revealed crescent-shaped organisms with a more pointed anterior than posterior end (banana-shaped morphology) confirming that the cysts belong to the genus *Besnoitia*.

To the best of our knowledge, this is the first clinical record of bovine besnoitiosis in Kenya.

**Keywords:** *Besnoitia besnoiti*, bovine, cutaneous and sclero-conjunctival cysts

### INTRODUCTION

Besnoitiosis is an acute or chronic disease caused by a coccidian protozoon of the genus *Besnoitia*. It affects a wide range of domestic and wildlife hosts (Bigalke 1968). The characteristic feature of besnoitiosis is the formation of cysts in the connective tissues of the skin, muscles and other organs (Schulz 1960). In nearly all cases of bovine besnoitiosis, white sand-like cysts in the sclero-conjunctiva are considered pathognomonic when associated with typical cysts elsewhere and are therefore of great clinical significance in diagnosis (Bigalke & Naudé 1962). The disease is of economic importance where it occurs in Africa and other parts of the world (Bigalke & Prozesky 1994).

Incidences of spontaneous besnoitiosis reported in Kenya before have been in goats (Bwangamoi 1967, 1968; Kaliner 1973; Heydorn, Senaud, Mehlhorn & Heinonen 1984; Bwangamoi 1989; Bwangamoi, Carles & Wandera 1989), a horse (Bwangamoi 1972) and a rabbit (Mbuthia, Gathumbi, Bwangamoi & Wasike 1993). Bwangamoi (1969) documented the presence of *Besnoitia* cysts in downgraded hides and skins. In this paper we present the clinical signs and structure of the aetiological agent in the first case of clinical bovine besnoitiosis diagnosed on the Galana ranch in the coastal region of Kenya.

### MATERIALS AND METHODS

The outbreak reported here occurred in East African Orma Boran cattle on the Galana beef ranch in Kenya in the period 1991 and 1992. Animals on this ranch are in a long-term research project on trypanosomiasis. The ranch has an area of some 6000 km<sup>2</sup> lying between 2°S and 3°S and 39°E and 40°E on the Galana River in the coastal hinterland of Kenya at an average altitude of 270 m above sea level. The mean

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annual rainfall increases from 250 mm in the West to 625 mm nearer the coast. The bulk of this precipitation occurs in two rainy seasons, the first of which occurs between March and April and the second, usually with heavier rainfall, between October and November. A wide range of fly and tick species infest about 35 % of the ranch (King, Heath & Hill, 1977). Many different species of wild animals inhabit the same area together with the domestic livestock.

Infected animals were identified by visual examination for the presence of cutaneous nodules and sclero-conjunctival cysts (Bigalke & Naudé 1962). Skin biopsy samples obtained from the ears of affected animals were embedded in paraffin wax, sectioned, stained with haematoxylin and eosin (H/E) and examined histologically. Skin scrapings collected in phosphate buffered saline (PBS, pH 7.2) to which 200 units/ml of benzylpenicillin sodium (DAWA Pharmaceuticals Ltd, Nairobi), 200 µg/ml streptomycin sulphate (Mac's Pharmaceuticals Ltd, Nairobi) and 50 µg/ml Nystatin (Mycostatin sterile powder, Squibb) had been added were crushed with a pestle in a mortar to free parasites from cysts (Bigalke 1962, 1967). The extract was filtered and centrifuged to a pellet and then resuspended in PBS. Smears of the material were made on microscope slides and fixed in alcohol, stained with Giemsa stain and examined for *Besnoitia* parasites at X400 magnification through a micrometer ocular lens.

## RESULTS

Infected animals had sand-like cysts on the sclero-conjunctiva and mucus membranes of the nasal cav-

ity. Some had muco-catarrhal to purulent conjunctivitis with crusts of dried exudates that attracted a lot of flies. The skin was unusually thick and nodular, non-elastic and thrown into folds (Fig. 1). Some sections were alopecic. The animals also had generalized lymphadenomegaly of superficial lymph nodes. Other large and benign swellings which exuded pus were occasionally encountered on the skin.

The animals were heavily infested with ticks at the bases of the horns and ears, and around the eyes and the anal areas. Most ticks were of the genus *Rhipicephalus*.

Histological examination of skin biopsy sections from the ear revealed conglomerates of large cysts separated by thick fibrous capsules. Moderate mononuclear cell reaction and extensive scleroderma were noticed (Fig. 2).

The cystozoites under the microscope were uniformly crescent-shaped and measured approximately 10 µm in length and 5 µm in diameter. On wet mounts they had a corkscrew type of motility with the anterior end being more pointed than the posterior end. In Giemsa stained preparations, the cytoplasm appeared granular and stained blue while the nucleus, situated near the center, stained reddish-purple (Fig. 3).

## DISCUSSION

Physical examination of the affected animals showed that not all animals with sclero-conjunctival cysts had cutaneous cysts. However, all cattle with cutaneous cysts had sclero-conjunctival cysts. The cysts observed in the sclero-conjunctiva and those on the skin



FIG. 1 A bull showing clinical signs of chronic besnoitiosis. Note the indurated wrinkly skin and the cutaneous nodules (arrows)

of the animals reported here were identical to those described previously for *B. besnoiti* (Hofmeyer 1945; Pols 1960). Examination of the sclero-conjunctiva for cysts of *B. besnoiti* is a reliable diagnostic procedure for subclinical chronic besnoitiosis (Bigalke & Naudé 1962).

It has been shown that chronically infected cattle with numerous cysts in the skin may serve as a source of infection for mechanical transmission of the disease by insect vectors (Bigalke 1968). The presence of chronically infected animals and a range of *Glos-*

*sina* and *Tabanus* spp. together with other flies and ticks on the Galana ranch presents optimum conditions for this mode of transmission.

Unconfirmed reports of seasonal outbreaks of besnoitiosis in the region have previously been made (Munga, personal communication 1992). This may be attributed to the seasonal occurrence of high fly populations in the region. It is notable that when the fly challenge was removed in a herd of 2 500 animals used in an intensive acaricide application trial to control ticks and flies, no animals developed besnoitiosis.

FIG. 2 Histological section of the skin showing colonies of large multinucleate cysts with thick fibrous capsules (S)  
H/E, X400

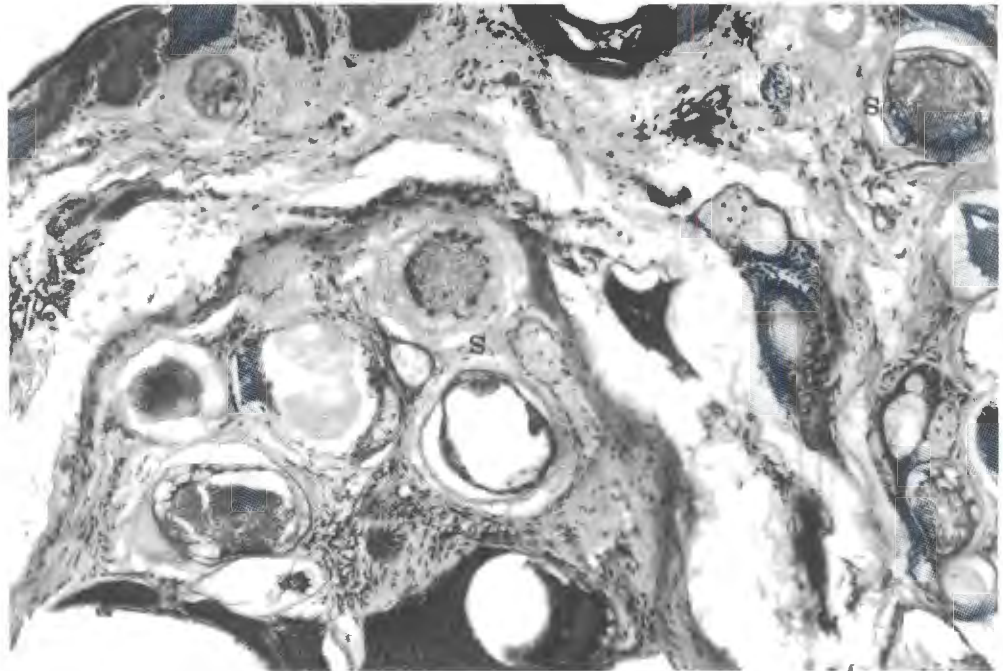
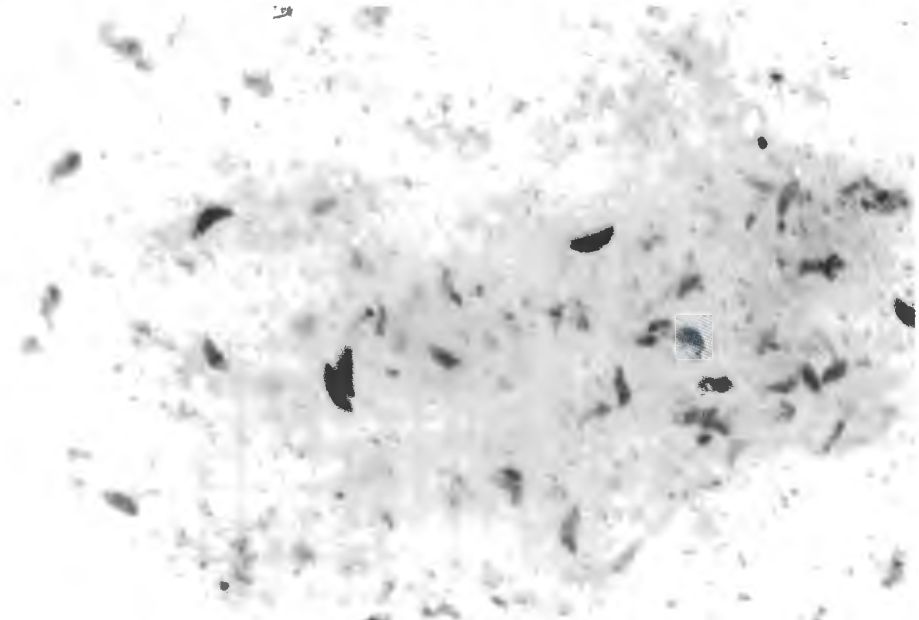


FIG. 3 *B. besnoiti* cystozoites obtained from cutaneous cysts  
Giemsa, X400



It is noted that besnoitiosis is an endemic problem on the ranch, and may be widely distributed and insidiously spreading in the region without being detected.

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