

# ANIMAL HEALTH

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Information on the livestock disease situation in the Sudan is mostly of an anecdotal nature and detailed studies showing prevalence and incidence data are few and far between.

Some of the diseases which are of most concern are:

Viral: rinderpest, foot-and-mouth disease, African horse sickness, Rift Valley fever, sheep pox, Newcastle disease, rabies.

Bacterial: contagious bovine pleuropneumonia, contagious caprine pleuropneumonia, anthrax, blackquarter, brucellosis, haemorrhagic septicaemia, dermatophilosis, avian borreliosis.

Parasitic: trypanosomosis, tick-borne diseases, gastro-intestinal parasites, ectoparasites.

Additional common, important diseases are for instance:

tuberculosis, tetanus, contagious ecthyma, enterotoxaemia, leptospirosis, salmonellosis, Johne's disease, Gumboro and Marek's diseases.

This section is limited to a few of the major diseases which are most influenced by climatic and/or vegetational differences in their geographical prevalence. They are mainly vector-borne diseases.

## Trypanosomoses

Some of the history is outlined by El Karib (1961). Bovine trypanosomosis was officially reported in the Sudan as early as 1904, while camel trypanosomosis made its first appearance in the official records two years later. It is believed that animal trypanosomosis must have existed much earlier than the records tend to show. "Guffar", the Arabic name for "surra" (*Trypanosoma evansi* infection) was apparently known in the country east of the Blue Nile for over 200 years and in the southern provinces the existence of local names for bovine trypanosomosis in the Nilotic languages indicates that it must have existed for a long period. ("Noi" in Dinka and Nuer, "Anoi" in Shilluk.)

A review of the situation of tsetse flies and trypanosomosis in the Sudan was given by **Buxton** (1955). His map of tsetse distribution, based on earlier reports by **Lewis**, is still largely valid today. Additional surveys of the situation in south-west Darfur, north-west Bahr El Ghazal, the Nuba Mountains and Kosti and Dueim districts were carried out from 1958 to 1960 (**Uilenberg**, 1960a, 1960b). Some of this work was reported by **El Karib** (1961) and further information was provided by **Yagi** and **Abdel Razig**, 1971, 1972, **Abdel Razig** and **Yagi**, 1973, and **Hall** et al., 1983, 1984. Trypanosomoses are widespread in most parts of the country and most domestic animals are affected. The species so far encountered in the Sudan are: *Trypanosoma congolense*, *T. vivax*, *T. brucei*, *T. evansi*, *T. simiae* and *T. equiperdum*.

*T. congolense* causes generally the most severe form of the disease in cattle in the Sudan. It also attacks horses, mules, dogs and camels, but has rarely been found in small ruminants in this country. Although it is generally accepted that *T. congolense* occurs mainly in areas within and immediately adjacent to the tsetse zones, there have been remarkable exceptions in the Sudan:

- a major outbreak of peracute bovine trypanosomosis in Upper Nile province in 1946 was due to *T. congolense* (**El Karib** et al., 1954, **Buxton**, 1955). Transmission was certainly mechanical in most parts of the province and the area carries an enormous population of Tabanidae and other biting flies (**Buxton**, 1955). **Buxton** (1955) reported *T. congolense* as far north as Kosti, and this species was the only one diagnosed in cattle on Abu Island in the White Nile (Kosti District), which is regarded as tsetse free (**Uilenberg**, 1960b).

*T. vivax* occurs in the tsetse zone, but also much further to the north. It has been diagnosed in sedentary herds along the White Nile up to almost the 14th parallel, in Dueim district, far from any known tsetse areas (**Uilenberg**, 1960b). It is certainly the most common species of trypanosome in cattle outside the tsetse zone, except for the sudd area in Upper Nile, where *T. congolense* is dominant. The disease in cattle is milder and more chronic than that caused by *T. congolense*. It has also been found in sheep and goats, but does not appear to affect these animals very much.

*T. brucei* affects equines, dogs, cattle and camels. In horses, camels and dogs it produces acute fatal trypanosomosis, while it is less pathogenic for cattle. Infection in small ruminants has not been documented in the Sudan. It has not been found outside tsetse areas.

*T. evansi* in the Sudan affects chiefly camels, causing surra (guffar in Arabic). Horses are also affected and suffer an acute disease similar to that caused by *T. brucei*. "Guffar" occurs where camels and biting flies, chiefly Tabanidae, are found together. This zone is limited to the north by a line stretching roughly from the 15th parallel in the west to the 18th in the east. North of this line camels exist without flies. South of the zone, which more or less stops at the northern tsetse belts, *Tabanidae* occur, but camels do not normally live there.

*T. equiperdum*, the cause of dourine, has been diagnosed on clinical and parasitological grounds in a donkey mare at Nyala (**Uilenberg**, 1961). This venereal disease of equines was known before to occur in northern and southern Africa. It may well have a more extensive distribution in tropical Africa, but little attention is paid to donkeys, and nervous disorders remain usually undiagnosed; the differential diagnosis includes viral encephalomyelitis as well as *T. brucei* and *T. evansi* infections.

The main tsetse fly zone covers an area of over 200,000 km<sup>2</sup> in the Sudan, south of a diagonal line from a point on the western border at almost the 11th parallel north to a point on the southern border at approximately 33° longitude east. Further to the east tsetse populations are more scattered and occur on the eastern border as far north as the Kurmuk area (about 10°N). Buxton's map shows the occurrence of flies even up to the 12th parallel on the border with Ethiopia. Moreover there were isolated pockets in the Koalib Hills in southern Kordofan, but these have now been eradicated.

Southern Darfur province is at the northern edge of the main African tsetse belt (Buxton, 1955). In the survey carried out from 1958 to 1960 tsetse flies were found considerably further North than was known before, as far as 11°4'N along the border with Chad and inside Chad even at 11°42'N, 6 km to the west of the border (Uilenberg, 1960a). All flies caught were identified as *Glossina morsitans submorsitans*. Further surveys confirmed the existence of this tsetse fly in south-west Darfur (Yagi & Abdel Razig, 1971, 1972; Abdel Razig & Yagi, 1973); these authors, apparently unaware of the earlier reports, believed that their findings represented an extension of the northern limit of the belt.

More recent and extensive surveys of southern Darfur, including the whole length of the Bahr El Arab riverine zone, between 1979 and 1981, indicated that the distribution of the only tsetse species present in that area, *Glossina morsitans submorsitans*, had not appreciably altered in the meantime, although it was not found north of 10°15'N (Hall et al., 1984). Fly populations are most dense in the woodland savanna in the south west corner of southern Darfur, south of Wadi Umbelasha. Lighter infestations occur in the woodlands north of this riverine system, to a latitude of at least about 11°4'N (Uilenberg, 1960a), although the drier conditions prevalent since that time may have reduced tsetse distribution in the area. Buxton (1955) already regarded the isolated pockets of tsetse flies north of the main belts as consistent with the view that this part of Africa is becoming drier.

Cattle of the nomadic Baqqara tribes in Darfur enter the tsetse zones of south-western Darfur during the dry season, in search of grazing and water. Many go even further, into the north-west of Bahr El Ghazal province, and also cross into north-eastern Central African Republic. At the end of the dry season the infected herds go north again and are the cause of mechanically spread trypanosomiasis in tsetse-free regions of Darfur. A similar situation occurs in southern Kordofan and northern Bahr El Ghazal province, where many Baqqara herds pass through tsetse pockets in the Jur Narrows, north of the main belt (Abdel Razig et al., 1968). On the other hand, mechanically transmitted bovine trypanosomiasis is apparently also able to maintain itself, without direct contact with tsetse, in large parts of Upper Nile province, southern Kordofan, and in Blue Nile province. Tabanids are probably the main culprits.

## Ticks and tick-borne diseases

These have acquired a greater importance in the Sudan since the introduction of more susceptible exotic stock for breed improvement programmes and dairy production. Hoogstraal's 1956 book on ticks of the Sudan has been a milestone, not just for our knowledge on Sudanese ticks but on African ticks in general.

**Ticks** cause direct losses:

- loss of blood resulting in anaemia, when present in large numbers;
- metabolic disorders responsible for loss in production;
- wounds leading to secondary abscesses, damaged teats and myiasis;
- lower value of damaged hides and skins;
- certain species inject toxins causing for example tick paralysis and sweating sickness.

Ticks may cause immunodepression, and the bacterial skin disease dermatophilosis is much more severe in the presence of African *Amblyomma* ticks. This association has been clearly shown to exist in Nigeria and in the Caribbean (**Plowright**, 1956; **BUTLER**, 1975). Severe forms of this disease are particularly common in the Nuba Mountain areas of Kordofan in zebu herds of the Baqqara during the rains and it is interesting to note that the nomads accuse *A. variegatum* of being the cause.

Ticks are even more important as vectors of tick-borne livestock diseases, caused by viruses, rickettsiae, bacteria and protozoa.

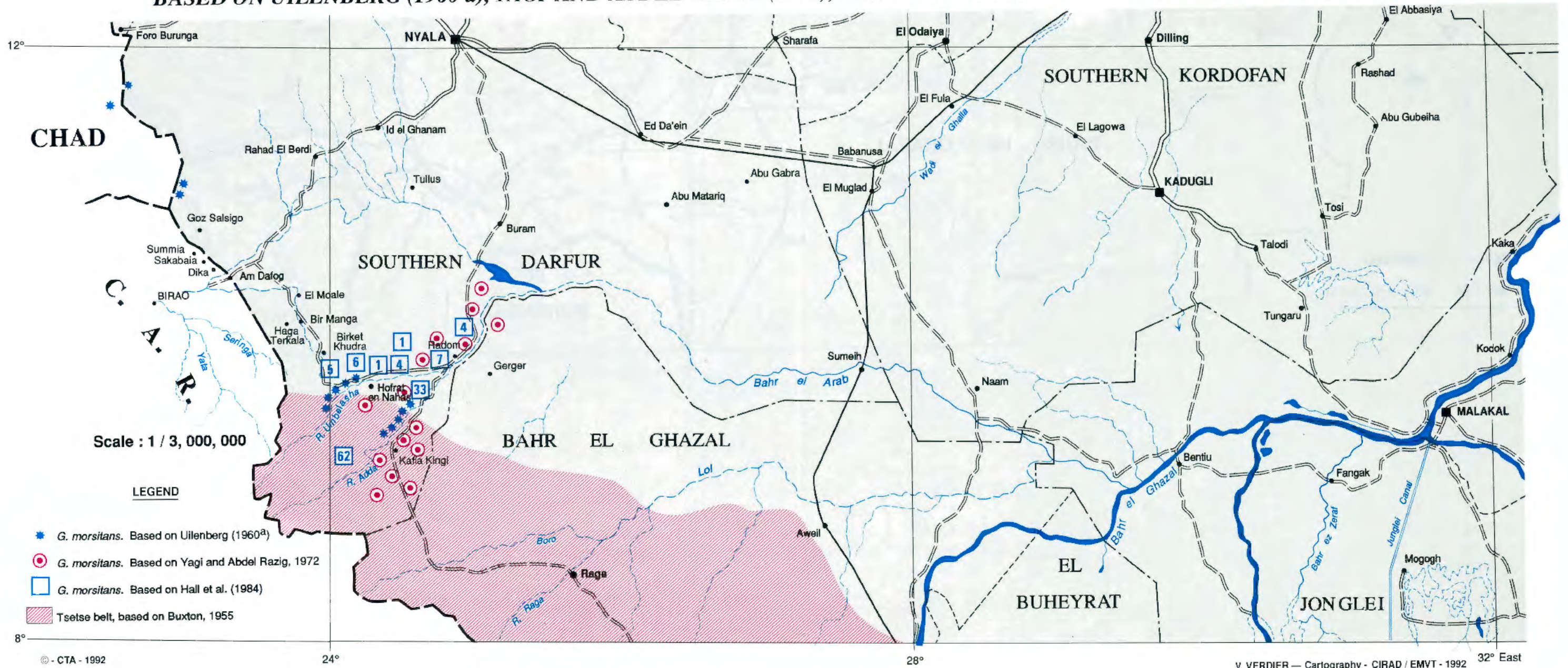
Theileriosis is probably the most important bovine tick - borne disease in the Sudan. *T. ANNULATA*, *T. parva*, *T. mutans* and *T. velifera* have been identified in cattle in the country, and *T. lestoquardi* (synonym *T. hirci*) in sheep. *T. mutans* of cattle is widespread, but is not thought to be of pathological importance in the Sudan. *T. velifera* is non-pathogenic.

Bovine theileriosis was first reported in Sudan in 1908.

*Theileria annulata* is transmitted by ticks of the genus *Hyalomma*, the chief vector being *H. anatolicum anatolicum*. The disease caused is variously called mediterranean or tropical theileriosis and occurs in northern and central Sudan. Although serological evidence for its occurrence in southern Sudan has also been presented (**Morzaria** et al., 1981), this could not be confirmed in further tests at Utrecht (the Netherlands); using antigens of the various species of *Theileria* on the same sera, the positive reactions to *T. annulata* antigen in southern Sudan appear to have been due to cross-reactions with *T. mutans* and *T. parva* (**N.M. Perié**, **F. Jongejan**, **G. Uilenberg**, unpublished data). Moreover, the chief vector *H. a. anatolicum* is not found south of Wad Medani in Blue Nile province (Anonymous, 1983).

# ANIMAL HEALTH

**DISTRIBUTION OF *G. MORSITANS* IN SOUTH WESTERN DARFUR,  
BASED ON UILENBERG (1960 a), YAGI AND ABDEL RAZIG (1972), ABDEL RAZIG AND YAGI (1973), AND HALL *et al.* (1984).**



## ANIMAL HEALTH (CONTINUED)

*T. parva*, the causal agent of East Coast fever, transmitted by *Rhipicephalus appendiculatus*, is known to occur in southern Equatoria since 1950 (Hoogstraal, 1956). The present northern limit of its distribution is not well-defined and serological evidence again is unreliable because of cross-reactions with other species. The hot plains further to the north are likely to limit the distribution of its vector.

*T. lestoquardi* was diagnosed in sheep in 1986. It can be transmitted by *H. a. anaticum* and may cause a problem in lambs.

Tropical theileriosis does not constitute a major problem in indigenous cattle which possess a degree of innate resistance; their calves in endemic areas are resistant. However, *T. annulata* is highly pathogenic to exotic Friesian or Friesian/Kenana cross-breeds, with a high mortality rate (Anonymous, 1983).

Other tick-borne diseases include heartwater (*Cowdria ruminantium* infection), transmitted by *Amblyomma* spp., which affects cattle, sheep and goats in large parts of the Sudan. It appears to be particularly prevalent in Kassala and Blue Nile provinces, where *A. lepidum* seems to be a particularly effective vector. Indigenous breeds in endemic areas have acquired considerable resistance because of long natural selection, but heavy losses in local small ruminants have been reported from Kassala province (Karrar, 1960). Babesioses and anaplasmoses of cattle and small ruminants do not appear to be a major problem in the Sudan, local breeds are resistant, especially when young. When nutrition is deficient (dry season) or intercurrent diseases have an immunodepressive effect (trypanosomosis), relapses of anaplasmosis or babesiosis may occur and contribute to anaemia. *Babesia bovis* is the cause of sporadic fatal cases of cerebral babesiosis in nomadic cattle in western Sudan (G. Uilenberg, unpublished observations, 1958-1960), presumably when they encounter rare scattered populations of the vector *Boophilus annulatus*; the far more common *Boophilus decoloratus* is a vector of *Babesia bigemina* only, not of *B. bovis*.

Equines are affected by babesioses, infection with *B. equi* being the greatest problem. Ticks of the genera *Rhipicephalus* and *Hyalomma* are vectors in the Sudan. Camels are not known to be affected by tick-borne diseases in the country, but suspected tick paralysis has been reported (Musa and Osman, 1990).

### Gastro - intestinal parasites

Domestic animals in the Sudan are host to very large numbers of helminths, as elsewhere in Africa. We mention in particular the high incidence of fasciolosis (*Fasciola gigantica*) and schistosomiasis (*Schistosoma bovis*) in swampy areas and near to rivers, and *Haemonchus contortus* and *Haemonchus longistipes*, which may cause heavy losses in small ruminants and camels, respectively. Hydatid cysts (*Echinococcus granulosus*) are frequent and constitute an important zoonosis.

The effects of helminths on livestock are manifold:

- mortality;
- total or partial condemnation of meat or viscera;
- loss of production (weight loss, growth rate, milk yield, depreciation of animal products);
- reduced resistance to other diseases;
- public health hazards;
- cost of treatment and control.

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