J. Protozool. Res., 8, 182-184 (1998)

Trypanosoma evansi in Sudan: An Overview of Current Research and an Evaluation of its Impact on Sudan Camel Wealth and Husbandry

M. M. MAHMOUD

AL Fashir University Khartoum, Sudan

Received 20 August 1998

A report on Sudan camel trypanosomosis has been given. The importance of camels as a source of food and capital earning for Sudan is projected. The seriousness of *Trypanosoma evansi* caused disease in camels is reported. An account is given of the disease vectors and their ecology. Constraints facing diagnosis and hence disease control were outlined. The Sudan with more than three million camels will continue to suffer immense losses due to trypanosomosis due to *T. evansi* because of improper diagnosis and apparent negligence of a vast animal wealth.

The Sudan is considered to be one of the largest in Africa and has the tenth in area in the world. Its total area is more than 600 million hectares. These are comprised of varying ecological, climatic and vegetarian zones of desert, semi-desert, poor Savannah, rich Savannah, high rainfall wood land savannah, swamps and hill and mountain country.

Camels have been known in the Sudan 2,500 years ago. Until the turn of the century camels provided the only means of transportation. Eversince 1928 camel caravans had all but disappeared from the road. Now camels are exported on foot to Egypt and Libya. The camel is perhaps the best adapted to its environment. Given no more than average rains the herds maintain uniformly good condition (Gillespie 1966). It is estimated that around 200,000 camels are consumed as meat in the Sudan annually, representing 8% of Sudan total meat consumption. This is 25,000 tons of camel meat annually.

Camel sales in international markets reached in 1990, 90,000 camels fetching $64 million. There is a continuous upsurge in camel sales export year by year. A typical ecology of camel raising land is characterized by a tropical continental climate ranging from subequatorial in the south to desert in the north. The duration of the rainy season (June to October) is determined by southerly winds. Most of the rains are in the form of showers or thunderstorms following perpetuate sandstorms. Rains vary in intensity year after year.

Vegetation prevailing in camel land is represented by *Blepharis edulis* (Siha), *Aristida* spp. (Gow), *Cymbopogan nervatus* (Nal) and *Schoenefildia gracilis* (Dembelab). All of these are palatable grasses. Some of the most edible trees are *Acacia mellifera* (Kitir) and *Acacia tortillis* (Seyal). These trees produce highly nutritious pods and browsing foliage or twigs. Thus abundant green grasses, legumes and young trees are available to camels in years of good rainfall (Abbas 1997).

With regard to Sudan camel population census it is safe to assume that it may exceed three million taking into consideration that this estimate itself is more than ten years old. Due to the stability of camel husbandry and undisturbed camel rearing in Northern Sudan it is likely that their population in the Sudan may surpass that of Somalia taking into account the unsettled state of affairs in that country over the last few years which may have seriously affected camel rearing there. The Sudan has recently instituted a council concerned with research and development of the camel under the Ministry of Animal Resources with members representing the Ministry, National Planning, Ministry of Finance and National Economy, Directorate of Range Management and Fodder, the Faculty of Veterinary Science

and the University of Khartoum Camel Research Unit. Public organizations such as the National Pasturalists Union are also represented in the Counci. A National Network for camel Research and Development has also been set up.

Five research centres have accordingly been established in various parts of the country taking into consideration the intensity of camel rearing and production (M.A.A.R., 1994).

Trypanosomosis due to *T. evensi* is now recognized to have the widest geographical distribution of any pathogenic trypanosome (Gardener and Mahmoud 1992).

The earliest records of camel trypanosomosis in the Sudan date back to 1905 (Oliver 1907). The disease is vernacularly named "Gufar". It is much dreaded by native camel owners and it eversince remains to be the most important camel disease in the Sudan. Prior to the availability of Naganol (Bayer 205) camel trypanosomosis went unchallenged resulting in the death of almost 90 percent of trypanosome infected camels (Knowles 1924).

The distribution of the disease is closely related to that of tabanids and the intensity of the outbreaks is directly related to the seasonal increase in fly numbers. There are, of course, trypanosomosis free areas which are ecologically unsuited to tabanids, just as there are trypanosomosis areas where camels cannot exist, these are the tsetse infested areas (Mahmoud and Oilman 1979).

Camel trypanosomosis due to *T. evensi* in the Sudan is usually encoutered between 10-15° Wester the Nile and 12-18° N. East of it.

Camel trypanosome transmission in non-tsetse areas has received little attention. This may be because the camel itself failed to attract scientists with the exception of the newly developed interest in it, may be because it may pose to some workers as a "scientific curiosity". This is fortified by the poor standing of camels in the O. I. E. disease lists and classifications. Another factor which may explain the paucity of information on its vectors especially tabanids is the fact that tabanids are diverse, ubiquitous and their habitat is varied and difficult to trace. This explain why as far no successful vector (tablanid) programme has been launched.

Tabanids are the most capable of the insects to transmit *T. evensi*. Rabid and Yaoi (1972b) studied their seasonal abundance and found that their breeding and prevalence are connected to rainfall, suitable moisture retaining clay soil and surface water pools. Therefore their increase in number are to be expected during the tropical rainy season (June to October).

Tabanids reported in the Sudan are: *Tetanus taeniola, T. biguttatus, Atylotus agrestis, A. fuscipes, Ancala latipes* and *Philoliche magrettii* (Mahmoud and Gray 1980). Most recently Khei et al. (1995) used portable canopy traps, blue and black, setting them around suspected tabloid habitats. They also searched for larval and pupae around rivers, pools and in dry and semi-dry locations. They added *T. gratus* to the old list which they confirmed. Both black and blue canopy traps where found equally efficient in attracting tabanids.

An investigation of tabanid ecology in arid zone should be carried out to determine to what extent changes in fly populations, climatic and physiological stress are responsible for seasonal variation in the prevalence of infection in arid zones (Gardiner and Mahmoud 1992). The prevalence of some tabanid species all year round such as *T. biguttatus* and to a lesser extent *T. taeniola* ensures that infection is constantly transmitted and disease maintained (Mahmoud and Gray 1980).

Apart from *tabanids*, Haematopota, Chrysops. Pangonia, Stomoxys and Hippoboscids are also incriminated in transmitting trypanosomosis to livestock. Theobold (1906) recorded *Hippobosca camelina, H. equina, H. longipennis* and others. Oilman and Yagi (1972)

caught *H. variegate* in Khartoum Province.

It is of considerable difficulty assessing the extent of economic loss due to camel trypanosomosis, due to *T. evensi* or any other trypanosome infection for that matter. Death of a camel can be considered to be total loss but other losses such as abortion, Tosses comprise draught power or work power as pack animals cannot easily be estimated. This is a part from the cost of drugs spent annually to cure positive cases. Although camels suffer from many of the diseases that affect cattle such as anthrax, Haemorrhage Septicemia and others against which Sudan Government launches an animal health and vaccination programme, camels and their problems are not included in this national disease control programme. Response to camel trypanosomosis is through chemotherapy on reception of reports only. Therefore, many infected camels escape notice in the vastness of Sudan without receiving appropriate attention. Even when cases are suspected, conventional methods of diagnosis are limited in their accuracy. Eighty eight % of the positive cases may not be recognized and therefore fail to be treated especially when disease symptoms are not typical or characteristic enough. What complicates matters is that tabanids and other haematophagus flies are so diverse and numerous. A full report on the life cycle and ecology of the tabanidae is given by Cross and Petal (1922). Therefore one should expect the disease to continue to be present and camel losses would increase in Sudan as long as camel trypanosomosis is not included in Sudan Animal Health Programmes. I hope O. I. E. would also reconsider its policies with regard to camel trypanosomosis and consider it among its priorities of animal disease control strategies.

REFERENCES

Abyss, B. I 997. Ethnoveterinary practices of camel pasturalists in Butana, North-Eastern Sudan. *DHP Publications Series No. 4, Deice,ner 1997. OSPREy Addis Ababa..*

Cross, H. E. and Petal, P. G. 1922. Camel Surra. Vet. Built. Dept. Agr., Punjab No. 8.

Gardener, P. R. & Mahmoud, M. M. 1992. Sanitarian trypanosomes causing disease in livestock outside sub-Saharan Africa. *Parasitic Protozoan. 2nd Ed.: 2: 277-314.*

Gillespie, T. A. 1966. The nomads of the Sudan and their livestock in the 20th century. *Sudan J. Vet. Sci. Anim. Husb. 7: 13-23.*

Kheir, S. M., Abdalla, H. S. & Ragman, A. H. A. 1995. A study of tsetse and tabanid flies in South Eastern Sudan. Sudan J. Vet. Sci. Anim. Husb. 34: 16-21.

Knowles, R. H. 1924. *Sudan Veterinary Department Annual Report, p. 30.*

Mahmoud, M. M. & Gray, A. R. 1980. Trypanosomiasis due to *T. evensi* (Steel 1885) Balbinai, 1888. A review of current research. *Trop. Anim. Health. Prod. l2: 35-47.*

Mahmoud, M. M. & Osman, O. M. 1979. A note on Trypanosomiasis in Sudan camels: In The Camelid, an all-purpose animal. Ross Cockrill ed. Scandinavian Institute of Africa Studies, Uppsala I 984.

Ministry of Agriculture & Animal Resources (M. A. A. R.) Sudan. 1994. *Document on Centres of Camel Res. and Development. Khartoum 1994.*

Oliver, A. 1907. *Sudan Vet. Dept. Ann. Repot, P. 841.*

Osman, O. M. & Yagi, A. I. 1972. A note on Hppoboscidae in Khartoum Province. Sudan J. Vet. Sci. Anim. Husb 13:27-29.

Yagi, A. I. & Rabid, M. T. A. 1972a. *Revue De zoologie et de botanique africanines. Bruxelles 86: 293-301* .

Yagi, A. I. & Rabid, M. T. A. 1972b. *Revue De zoologie et de botanique africanines. Bruxelles 85: 3-4.*