SUSCEPTIBILITY OF DIFFERENT BREEDS OF GOATS IN KENYA TO EXPERIMENTAL INFECTION WITH 
TRYPANOSOMA CONGOLENSE

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SUMMARY

To assess whether there was any evidence of genetic resistance to African trypanosomiasis, five breeds of goat (East African, Galla, and crossbreds between East African and Galla, Nubian or Toggenburg) were experimentally infected with Trypanosoma congoense either by needle inoculation or by tsetse-transmission. The goats had not been previously exposed to trypanosomiasis. With both methods of infection all breeds were found to be highly susceptible and suffered severe disease. Following tsetse-transmitted infection no significant differences were observed between breeds in the development, duration and size of the chancre reaction or in the degree and duration of parasitaemia. While Nubian goats developed anaemia more rapidly than the other breeds, all animals experienced a pronounced reduction in packed red cell volume. Similarly following needle inoculation no differences were found between breeds in the severity of anaemia or in the kinetics of parasitaemia. Immune responses against both metacyclic and bloodstream trypanosomes of the infecting serodeme were similar in all breeds as were the erythropoietic responses to the infection. No alterations in leucocyte parameters occurred.

INTRODUCTION

Increasing consideration is being given to the propagation of trypanotolerant breeds of domestic livestock in regions of Africa infested with tsetse. It has been observed in the field and confirmed under experimental conditions that certain breeds of cattle, particularly the N'Dama and West African Shorthorn, have an inherent degree of trypanotolerance (Roberts and Gray, 1973; Murray, Morrison, Murray, Clifford and Trail, 1979; Murray, Clifford, Gettinby, Snow and McIntyre, 1981) and this is associated with an ability to control trypanosome numbers and resist the effects of the disease (Murray, Morrison and Whitelaw, 1982). In contrast, while goats and sheep survive in tsetse-infested areas, the evidence that they do so by controlling trypanosome growth and resisting the effects of the disease is limited.

It is only recently that experiments have been carried out to investigate the comparative susceptibility of different breeds of goats and sheep to experimental trypanosomal infection. In West Africa Djallonké sheep were found to be more resistant than Fulani sheep to syringe-passaged Trypanosoma congoense (Toure, Seye, Dieye and Mbengue, 1983). On the other hand in a non-comparative study
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*T. brucei* was found to be pathogenic in Djallonké sheep (Ikede, 1979). With regard to goats Cameroon Dwarf goats which suffered fatal infections with *T. brucei* were only mildly affected by *T. vivax* or *T. congoense* (Bungener and Mehlitz, 1976) while Red Sokoto Dwarf goats succumbed within 70 days to *T. vivax* (Saror, 1980). Fewer studies have been conducted in East Africa but the work of Griffin and Allonby (1979a, b) has suggested that indigenous sheep (Red Masai and Blackhead Persian) and goats (Galla and East African) are more resistant than imported breeds (Merino sheep and Saanen goats) to syringe-passaged *T. congoense* and also to field challenge. The present studies were undertaken to determine if differences in susceptibility could be demonstrated among different breeds of goats in Kenya following infection by either syringe-passaged or tsetse-transmitted *T. congoense*.

**MATERIALS AND METHODS**

Five breeds of goat were studied: indigenous East African and Galla, and crossbreds between East African and either Galla, Toggenburg or Nubian. All goats were castrated males 10 to 12 months of age and were obtained from commercial ranches north of Nairobi in the Rumuruti area which is free of tsetse. The herds had been reared within this area for many years and were thus extremely unlikely ever to have been exposed to trypanosomiasis. All animals were screened before going under experiment and were serologically negative for the infecting trypanosome serodeme. The animals were housed in maximum fly-proof isolation facilities.

Two experiments were carried out:

1. Two breeds of goat, 11 East African and nine Galla, were infected by syringe inoculation of bloodstream forms of *T. congoense* IL 958 derived from an isolate from a lion in Serengeti National Park (STIB 212; Geigy and Kauffmann, 1973); the primary isolate STIB 212 was cloned and passaged in rats and mice to give stabilate IL 958. For infection of goats 10⁵ organisms were inoculated intraperitoneally into lethally irradiated A/J mice (900 rad) and after six days trypanosomes in blood were collected to initiate infection. The goats were inoculated subcutaneously in the neck with 10⁵ bloodstream forms and monitored for 10 weeks.

2. Five breeds of goats, nine East African and Galla, and East African crosses with Galla, Nubian and Toggenburg (10 per group) were each infected by four tsetse flies infected with *T. congoense* carrying the same serodeme as IL 958 and monitored for 16 weeks. Teneral *Glossina morsitans centralis* from the ILRAD colony were allowed to feed on a goat infected with *T. congoense* ILNat 3.1 a cloned derivative of STIB 212. Subsequently the tsetse were maintained on uninfected rabbits. After 25 days tsetse were allowed to probe singly on slides at 37°C to identify those with mature infection for challenge of goats. Geigy-1 cages each containing one fly were placed on four sites on the shaven flank of each experimental goat and the flies allowed to feed.

Goats were bled daily for the first six weeks post-infection and thereafter twice per week. Samples (3 ml) of jugular blood were collected into vacutainers containing EDTA as anticoagulant. Parasites were detected by examining theuffy coat as described previously (Murray, Murray and McIntyre, 1977). This method detects *T. congoense* to approximately 5×10² organisms/ml and a quantitative scoring system of one to six on an approximate logarithmic scale can be applied according to the number of parasites observed in the preparation.