Theleria parva is a protozoan parasite, which causes East Coast fever (ECF) and is responsible for high morbidity and mortality of cattle in East and Central Africa and is thus the biggest constraint in the development of the livestock industry in this region. The infection and treatment method of immunisation is currently the most practical means for the control of ECF. To make the sporozoite stabilate used in this method, *Rhipichephalus appendiculatus (Neumann)* nymphs have to be fed on infected cattle and the resulting adults have to be pre-fed on rabbits for maturation of sporozoites. This reliance on experimental animals makes the method expensive and hard to standardise. This problem can be alleviated if the stabilate is made from *in vitro* fed ticks. However, this has not been possible for it has been difficult to propagate the required highly infected R. *appendiculatus* through *in vitro* system.

This study was undertaken to develop an *in vitro* feeding system for *R. appendiculatus* nymphs and then the system was used to infect the nymphs with *T. Parva*. It consisted of rabbit skin membranes coated with concentrated cattle ear was and tick faeces. Sporozoite stabilates were made from the adult's ticks and their infectivity to cattle and the immunity they induced were investigated.

Comparison of feeding success and developmental rates of the ticks showed that then *in vitro* fed nymphs attained an overall mean engorgement weight of 5.94±0.32 mg and this was not significantly different from that 6.35±0.36 mg for ticks fed directly on steers ($P>0.05$) The *in vitro* fed nymphs attained a mean moulting duration of 15.8 days and a moulting rate of 63 %. The in vivo fed ones had a moulting rate of 84.2 % and mean moulting duration of 14.8 days.

Infection rate with *T. Parva*, in vitro fed adult females was 52.4% and this was not significantly different ($P>0.05$) from 50 % for in vivo fed females. The average number of infected cells per tick (infection abundance) for the former (*in vitro*) was 1.38 while for the latter (*in vivo*) was 1.4. The
in vitro fed males had an infection rate of 28.6 % and infection abundance of 0.5 respectively while the *in vivo* fed ones had an infection rate and abundance of 33.3% and 2.0 respectively. The infection rate of the males was also not significantly different ($p>0.05$).

Sporozoite stabilates derived from ticks fed through both systems showed the same level of infectivity and virulence to cattle. Two pairs of steers inoculated with stabilates from each system showed similar disease characteristics. After a homologous lethal challenge, the two pairs of steers infected with both stabilates were found to be immune. In contrast to the controls, these steers did not get fever and only got a mild schizont parasitosis and recovered without treatment. The two naive controls acquired clinical ECF and were treated with Butalex (pitman-Moore LTD, Germany).

In this study, transmission of *T.Parva* to *R. appendiculatus* nymphs was achieved through an *in vitro* system using rabbit skins. This system provides an efficient method that could be used in the study of parasite transmission and developmental dynamics of Ixodid tick borne pathogens without the host-parasite interactions. The result show that *T. Parva* sporozoite stabilates from *in vitro* fed ticks are infective and confer immunity to the mammalian host against a homologous challenge. These results are step forward in an attempt to standardise and reduce the cost of the infection and treatment method of immunisation currently in use.