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Immunization against east coast fever by infection and treatmeut method in Uganda

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Abstract

East Coast Fever (ECF) caused by *Theileria parva* is known in Uganda as the most important tick-borne disease of cattle for a long time. The paper describes research efforts conducted mainly in Kenya and Uganda towards the development and testing of the infection and treatment method of immunization against ECF. This method has now been introduced on private farms and it is accepted in Uganda.

Key words: East Cost Fever, tick borne, immunisation.

Introduction

The disease "Amakebe" later identified as East Coast Fever (ECF) was described for the first time in Uganda by Bruce and Hutchins 1908 - 1910 (Oteng, 1973). ECF is caused by *Theileria parva*, a protozoan parasite and is transmitted by the three host tick, *Rhipicephalus appendiculatus*.

ECF is probably the most important tick-borne disease of cattle due to the high mortalities caused, productivity losses on recovery, the cost of control and exclusion due to their high susceptibility of exotic and cross-bred cattle from endemic regions (Young *et al.*, 1988)

For many years the control of ECF has relied on short-interval acaricide application. However, this has not proven to be 100% effective (Norval *et al.*, 1992). An alternative approach has focused on immunization of cattle against ECF using live parasites (Radley, 1981).

Currently, the only available method for ECF immunisation, called infection and treatment method (Radley, 1981), has been tested in different countries of eastern, central and southern Africa (Musisi *et al.*, 1989) and is obtaining widespread acceptance.

This paper reviews research efforts towards development and introduction of the vaccine against ECF in Uganda.

Vaccine development 1910 - 1980

Following outbreaks of ECF in South Africa, attempts were made to immunise cattle using hyper immune serum and heat-killed Schizont-infected cells without success. The observation that cattle that recover from ECF are strongly immune encouraged scientists to search for vaccine against ECF. Neitz (1957) reported that prolonged treatment with chlortetracycline, during incubation period of ECF suppressed severe disease reaction and produced immune cattle. The early method of immunisation depended on infection of cattle with sprozoites using infected ticks and a prolonged period of tetracycline treatment. Furthermore, with the production of stabilates of sporozoites harvested from infected ticks (Cunningham *et al.*, 1973), a uniformly lethal ECF reaction was obtained by infection of cattle with a sporozoite stabilate. Brown *et al.*, (1977) reported for the first time, the immunization of cattle against ECF using sporozoite stabilates and treating each animal with 4 daily doses at 5mg/kg tetracycline following inoculation with stabilates. Radley (1981) used a short acting formulation of oxytetracycline using 2 doses of 10 mg/kg on days 0 and 4 of sporozoite stabilate inoculation. This regime of chemotherapy was further modified by using a long - acting formulation of tetracycline. Animals could be successfully immunised with a single dose of (20mg/kg) given simultaneously with the stabilate. The cattle that become immune were subsequently resistant to homologous challenge (Neitz 1957) and in the absence of further challenge, lasts for at least 3 years (Burridge *et al.*, 1972).

Cross -immunity studies and field challenge of animals immunised by the infection and treatment method showed that different immunogenic types of *T. parva* existed in the field (Young *et al.*, 1977). In order to provide a wide antigenic cover, the use of a cocktail of *T. parva* stocks was explored. A combination of 3 theilerial strains namely *T. parva* (Muguga) *T. parva* (Kiambu 5) and *T.p. lawrencei* (Serengeti transformed) called Muguga cocktail" was found to protect against *T. parva* stocks from widely different locations.

ECF Immunisation Trials in Uganda 1972 - 1994

In Uganda, the infection and treatment method of immunisation against ECF, using *T. parva* (Muguga) was first tested at Kigungu, Entebbe with UNDP assistance in 1972-1976 (Robson et al., 1977). In this trial, *T. parva* stabilates used were *T. parva* (Muguga) *T. parva* (Entebbe1) isolated from Kigungu, and *T. parva* (Entebbe (II) isolated from Livestock Experimental Station, Entebbe. It was reported that immunised cattle were significantly

protected inspite of a massive and continuing natural challenge of *T. parva* and *T. mutans*.

Field trials were further carried out between 1990- 1993 using the AMuguga Cocktail@ trivalent vaccine following successful trials in Malawi, Zambia and Tanzania (Mutugi and Otim, 1991; Mutugi *et al*., 1995).

Trials were conducted in Mukono, Mbarara and Mbale with the following results :

- 90% vaccine safety
- 94% antibody stimulation (Sero conversion)
- 80% protection from locally occurring ECF parasites.

The vaccine was therefore recommended for use on private farms.

In Uganda, ECF Immunisation on Private Farms 1994 - 1998

ECF immunisation using ' Muguga Cocktail' trivalent vaccine on private farms was started in 1994 (Moran *et al*., 1997). To date 5370 head of cattle, of mainly pure exotic and cross-bred stock on 450 farms have been immunised in 20 districts. This figure includes more than 1500 calves that have been immunised at partial cost recovery.The observations include, 90% vaccine safety with less than 8% requiring extra treatment, 86% sero-conversion and 50% reduction on tick control intensity on some of the participating farms. Farmers have accepted the vaccine as an additional method for the control of ECF.

Future strategies for ECF control

With the availability of new drugs for treatment of ECF, new generation of acaricides with novel methods of administration together with infection and treatment method of immunisation, the future ECF control strategies will aim at establishing integrated ticks and tick-borne disease control using a combination of the above methods depending on the severity of the disease.

Alternative safer, cheaper and easier methods will be sought. Already there are sub-unit vaccines being developed by ILRI scientists (Musoke *et al.,* 1992) which are being tested in the field (ILRI Newsletter.1997).

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