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Emergence of Tick-Borne Pathogens: Threat to Animal and Human Health

*Extracted from Research Done by:
Dr. Shepelo Getrude Peter
University of Nairobi
Faculty of Veterinary Medicine
Department of Clinical Studies*

Executive Summary

Tick-borne diseases (TBDs) are a cause of significant economic losses in ruminant animal production especially cattle through suboptimal production, poor reproductive performance and occasional mortalities [1]. Some of the TBDs have clear clinical symptoms, while others lack clear symptoms but subtly cause gradual debilitation or generally poor animal performance. Some of the tick-borne pathogens cause zoonotic diseases, hence posing health risk to animal owners and handlers who are in constant contact with the animals. Emerging tick-borne pathogens are the greatest risk because they cause TBDs that are not anticipated and whose symptoms are unknown. While the prevalence of previously endemic TBDs in Kenya such as classic East Coast Fever, Anaplasmosis and Babesiosis may be decreasing, emerging TBDs are becoming more prevalent owing to continuing climate change. This policy brief describes occurrence of emerging tick-borne pathogens recently diagnosed in dairy cattle in Nairobi County and the periurban Nairobi and proposes strategies for definite diagnosis and control.

Introduction

East Coast Fever (ECF), Anaplasmosis and Babesiosis are some of the TBDs that have previously caused massive economic losses in dairy and beef cattle in Kenya through various ways [1]. However, the diversity and epidemiology of TBDs is constantly changing due to the effects of climate change, increasing human population [2] and constantly evolving land use patterns in Kenya especially in urban and peri-urban areas [3]. While there is evidence of a decrease in the previously endemic TBDs of cattle in Kenya, there a rise in other less attended to TBDs such as Ehrlichiosis in cattle, which was considered less widespread [4]. Ability to diagnose and understanding emerging TBDs is important because some of them are zoonotic and major risk to humans who come into regular contact with the affected cattle. In Kenya, microscopy and serology, which have been relied on as diagnostic methods for TBDs have low sensitivity and do not clearly detect the cross-reaction between some of the TBD-causing pathogens [5, 6]. Molecular diagnostic techniques are more sensitive and confirmatory [7], but have rarely been employed in Kenya [8]. The objective of the research was to determine possible emerging tick-borne pathogens in cattle in Nairobi County and its periurban areas to corroborate the rising cases of cattle Ehrlichiosis. This was done through molecular diagnostic techniques that were used to analyze blood from 306 dairy cattle in 109 smallholder dairy farms. The study was prompted by observations made during routine clinical practice of dairy cattle calves that progressively lost body weight despite almost normal feeding and after a prolonged time they in each case, the calves died. Blood collected from some of these calves revealed presence of *Ehrlichia* infections. The study was designed to validate these observations.

Research approach

The study was cross-sectional conducted in Nairobi City County involving Dairy cattle from few Sub-Counties, which included Kasarani, Lang'ata, Dagoretti and Westlands. Whole blood was collected from 306 dairy cattle, genomic DNA extracted and 16S rDNA gene of *Anaplasma* and *Ehrlichia* genera used to analyze for presence of tick-borne pathogens. Sequencing and phylogenetic reconstruction were further conducted to confirm the species of the pathogens present.

Research findings

Out of 306 blood DNA samples analysed 61 (19.9%) and 10 (3.3%) were positive for *Anaplasma* and *Ehrlichia* species, respectively. Representative samples were sequenced for confirmation of species. Among other species, the study revealed presence of emerging *Anaplasma platys* and *Ehrlichia minasensis* that infected dairy cattle [9]. This was the first report of cattle infections with these pathogens in Kenya. Clinical disease associated with *Anaplasma platys* is not well described. Nevertheless immunosuppression associated with neutrophils in this disease may predispose the cattle to other diseases including the endemic tick-borne diseases such as East Coast Fever, Babesiosis and Anaplasmosis. diseases such as East Coast Fever, babesiosis and anaplasmosis. Moreover, the zoonotic potential of this pathogen has been well described [10, 11], therefore posing risk

of infection to cattle owners and handlers who are in constant contact with the animals during routine farm activities. *Ehrlichia minasensis* can cause fatal disease mainly characterized by diffuse lymphadenopathy [12]. The invasive tick *Rhipicephalus microplus*, which is the vector for *E. minasensis* was also observed in the study animals, possibly suggesting re-emergence of these vectors too.

Policy recommendations

1. Review the effectiveness and enhancement of the current tick-control strategies in order to control possible emerging tick-borne pathogens.
2. Regular surveillance for early detection of emerging tick-borne pathogens on disease-mapping and management strategies countrywide.
3. Collaboration between State Department of Livestock in the Ministry of Agriculture, Livestock, Fisheries and Cooperatives with the Ministry of Health for regular testing of people who come into contact with the infected animals for possible tick-borne zoonosis in order to map out strategies for mitigation.
4. Regular surveillance of the tick vectors present in various geographic areas to strategize preventive measures against impending TBD outbreaks and for prompt interventions.
5. Enforcing regulations on movement of animals as one of the key measures to preventing spread of new tick-species from infested areas to other non-infested geographical areas.

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