# A LANDSCAPE APPROACH TO THE EPIDEMIOLOGY OF THEILERIA PARVA AND BRUCELLA ABORTUS INFECTIONS AMONG DISTINCT MORPHOMTRIC CATTLE POPULATIONS IN UGANDA

**BY**

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**Abstract**

Indigenous cattle constitute a major source of livelihood and socio-cultural heritage for several rural household communities located in the different agro-ecological zones (AEZs) of Uganda. These AEZs have landscape attributes and environments that have a potential to influence, over a long period of time, the type of cattle, productivity levels and disease occurrence patterns. The overall goal of this study was to generate knowledge to improve disease control and enhance food security in Uganda. The study envisaged four specific objectives including the determination of the patterns of morphometric traits variations, geographic distribution and genetic population structure of *T. parva* infection, and the spatial distribution of Brucella antibodies among indigenous cattle breeds in Uganda.

Firstly, the patterns of morphometric trait variations of female indigenous cattle populations in the contrasting AEZs of Uganda were investigated. The main

findings indicate that indigenous cattle morphometric traits vary with age, breed and AEZ. These variations are useful for indigenous cattle classification in terms of productivity, diversity, adaptation to the different AEZs in Uganda. These findings benefit sustainable indigenous cattle utilization and conservation schemes.

Secondly, a national wide distribution of non-clinical *T. parva* infection among indigenous cattle breeds was investigated. The findings have shown that indigenous cattle (Ankole) populations of the Southern Western (Pastoral Rangelands, Southwestern farmlands and Western highland ranges) exhibited significantly higher prevalence of non-clinical *T. parva* infection (36 – 43%, 95% CI:$p<0.05$) compared to the East African shorthorn zebu of the reference Northeastern savannah grassland (17%) AEZs. These findings constitute critical baselines for development, deployment and appraisal of novel control strategies for East coast fever (ECF).

Thirdly, the population structure of *T. parva* was investigated and the findings have revealed high genetic diversity of the surveyed parasite populations ranging from 0.643 ± 0.55 to 0.663 ± 0.41 among the Central and Western AEZs, respectively. Similarly, significant pair wise population genetic differentiations ($P<0.05$) were observed with $F_{st}$ values varying from 0.048 to 0.173 between the eastern and northern, eastern and western populations, respectively. These findings are critical for the enhancement and appraisal of the infection and Treatment Method (ITM) control strategies in Uganda.

Fourthly, the spatial distribution of Brucella antibodies among indigenous cattle populations was investigated. The results indicate that a significantly high sero-prevalence (19.6%) and risk of brucellosis occurs in the Northeastern dry lands (Or: 3.40, 95% CI: 1.34, 8.57, p = 0.01) among the East African shorthorn zebu (EASZ) compared to the reference category of the Kyoga plains AEZ. Brucellosis

is furthermore perpetuated by poor hygienic practices at birth, during abortion and advanced gestation and keeping cows for long periods with the herds. Morphometric traits, distribution and population genetic structure of *T. parva*, and the spatial distribution of B. abortus antibodies follow specific patterns among indigenous cattle populations. These patterns provide suitable guidance for the deployment and appraisal of control strategies of ECF, brucellosis and conservation of indigenous cattle in Uganda.