Estimation of tsetse challenge and its relationship with trypanosomosis incidence in cattle kept under pastoral production systems in Kenya

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Abstract

In an on-farm trial conducted amongst the Maasai pastoralists in Nkuruman and Nkineji areas of Kenya between April 2004 and August 2005 designed to evaluate the effectiveness of a synthetic tsetse repellent technology, we assessed the relationship between tsetse challenge and trypanosomosis incidence in cattle. Six villages were used in each area. Each of these villages had a sentinel cattle herd that was screened for trypanosomosis on monthly basis using buffy coat technique. Animals found infected at each sampling were treated with diminazene aceturate at 7 mg kg⁻¹ body weight. Treatments administered by the owners over the sampling intervals were recorded as well. Tsetse flies were trapped at the time of sampling using baited stationary traps and apparent tsetse density estimated as flies per trap per day (FTD). A fixed proportion (10%) of the flies was dissected and their infection status determined through microscopy. Blood meals were also collected from some of the flies and their sources identified using enzymelinked immunosorbet assay (ELISA). Tsetse challenge was obtained as a product of tsetse density, trypanosome prevalence and the proportion of blood meals obtained from cattle. This variable was transformed using logarithmic function and fitted as an independent factor in a Poisson model that had trypanosomosis incidence in the sentinel cattle as the outcome of interest. The mean trypanosomosis incidence in the sentinel group of cattle was 7.2 and 10.2% in Nkuruman and Nkineji, respectively. Glossina pallidipes was the most prevalent tsetse species in Nkuruman while G. swynnertoni was prevalent in Nkineji. The proportions of tsetse that had mature infections in the respective areas were 0.6 and 4.2%. Most tsetse (28%) sampled in Nkuruman had blood meals from warthogs while most of those sampled in Nkineji (30%) had blood meals from cattle. A statistically significant association between tsetse challenge and trypanosomosis incidence was obtained only in Nkuruman when data was pooled and analyzed at the area but not at the village-level. In the later scenario, lagging tsetse challenge by 1 month improved the strength but not the significance of the association. These findings show that when the spatial unit of analysis in observational studies or on-farm trials is small, for instance a village, it may not be possible to demonstrate a statistically significant association between tsetse challenge and trypanosomosis incidence in livestock so as to effectively control for tsetse challenge.