

The effects of host physiology on the attraction of tsetse (Diptera: Glossinidae) and *Stomoxys* (Diptera: Muscidae) to cattle

S.J. Torr^{1*}, T.N.C. Mangwiro^{2,3} and D.R. Hall¹

¹Natural Resources Institute, University of Greenwich, Chatham Maritime, Kent, ME4 4TB, UK: ²Tsetse and Trypanosomiasis Control Branch, PO Box CY 52, Causeway, Harare, Zimbabwe: ³Midlands State University, Gweru, Zimbabwe

Abstract

In Zimbabwe, studies were made of the numbers of tsetse (*Glossina* spp.) and stable flies (*Stomoxys* spp.) attracted to cattle of different nutritional status, age and sex. Host odours were analysed to determine the physiological basis of these differences and improved methods are described for measuring rates of production of kairomones. Seasonal fluctuations in host weight, related to changes in pasture quality, had no significant effect on attraction of tsetse or *Stomoxys*. However, both attraction to different individuals and carbon dioxide production by these individuals were strongly correlated with weight, suggesting a possible link. Attraction to the odour from different types of cattle decreased in the order ox > cow > heifer > calf, and oxen were twice as attractive as calves of less than 12 months old. Lactation did not alter the relative attractiveness of cows. Calves less than six months old produced lower levels of carbon dioxide, acetone, octenol and phenols than oxen, but for older calves and cows, levels of production of known kairomones and repellents were similar to those of an ox. Carbon dioxide produced by cattle varied according to time of day and the animal's weight; cattle weighing 500 kg produced carbon dioxide at a mean rate of 2.0 l min⁻¹ in the morning and 2.8 l min⁻¹ in the afternoon compared to respective rates of 1.1 and 1.9 l min⁻¹ for cattle weighing 250 kg. Artificially adjusting the doses of carbon dioxide produced by individual cattle to make them equivalent did not remove significant differences in attractiveness for tsetse but did for *Stomoxys*. Increasing the dose of carbon dioxide from 1 to 4 l min⁻¹ in a synthetic blend of identified kairomones simulating those produced by a single ox, increased attractiveness to tsetse but not to the level of an ox. The results suggest that the main sources of differences in the attractiveness of individual cattle are likely to be variation in the production of carbon dioxide and, for tsetse, other unidentified kairomone(s). The biological and practical implications of these findings are discussed.

Keywords: tsetse, *Glossina*, *Stomoxys*, cattle, Zimbabwe, kairomones, carbon dioxide, host odour

*Fax: +44 (0)1634 883379

E-mail: s.torr@gre.ac.uk