



Reply to the letter to the editor

Reply to the letter to the editor by Bouyer et al. (2013)[☆]

Who is really misleading decision-makers about cost-effective approaches to tackling tsetse flies?

Bouyer et al. (2013) claim we have given misleading advice in our paper (Shaw et al., 2013) on the costs of controlling or eliminating riverine or savannah species of tsetse using various techniques, singly or in combination. We suggested that the most cost-effective option is often tsetse control, rather than elimination. In contrast, Bouyer et al. (2013) focus on the importance of eliminating tsetse from whole belts of contiguous tsetse infestation, and claim that for riverine species the only means of achieving this is to rely on the sterile insect technique (SIT) to deliver the final blow to populations suppressed by other methods.

The focus adopted by Bouyer et al. (2013) accords with their involvement in an SIT-based elimination programme in Senegal (Vreysen et al., 2013). Given that SIT deals particularly poorly with the problem of tsetse invasion (Vale and Torr, 2005) it is not surprising that they link the use of SIT to the aim of widespread elimination of tsetse up to the natural barriers to invasion – the so-called area-wide policy. Nor is it surprising that they claim that SIT is essential for final elimination since the use of this complex, costly and protracted technique makes sense only if cheaper and simpler techniques cannot perform the task unaided by SIT. To maintain their stance, they ignore evidence detrimental to their cause and advance only weak arguments, which we challenge below.

First, Bouyer et al. (2013) criticise the model (Vale and Torr, 2005; Torr and Vale, 2011) that we used to assess conservatively the time for which various elimination techniques need to be applied. The criticisms levelled against this model and, implicitly against the model of Hargrove (2003), distract attention from the pertinent point that no alternative model has shown anything materially different. The only model that seemed to attempt this (Barclay and Vreysen, 2011a) considered technical efficacy alone, not costs, and was flawed in its structure and parameters, as outlined by Hargrove et al. (2011) and

subsequently acknowledged by the model's authors (Barclay and Vreysen, 2011b, 2013).

Second, Bouyer et al. (2013) present a review table listing field operations purporting to prove that only campaigns involving SIT have ever eliminated riverine tsetse. That table is highly selective in failing to mention insecticide-based campaigns that have eliminated riverine flies without SIT, as in northern Nigeria (Davies, 1971; Spielberger et al., 1977; Jordan, 1986). It is particularly surprising that they did not mention the use of low technology methods to eliminate riverine tsetse from Principe Island off the west African coast (Maldonado, 1910; Jordan, 1986), since that work forms the natural counterpoint to the much advertised SIT-assisted operations on Unguja Island, Zanzibar (Vreysen et al., 2000). Moreover, their table is misleading and confused in that of the 14 separate operations listed, only six were aimed at elimination and three of these dealt with savannah tsetse. A project, such as that of Laveissière and Couret (1981), which ran for only two months, can hardly be judged as a failed elimination attempt when elimination was clearly not its objective. In general, any elimination operation that does not address a fully isolated population, or which does not maintain indefinitely an artificial barrier to invasion, runs a severe risk of eventual failure. To be objective, Bouyer et al. (2013) should also have commented in their table on those interventions listed that have faced this problem, including SIT-based schemes (Cuisance et al., 1984; Takken et al., 1986 as referred by Bauer et al., 1988; Oluwafemi, 2009).

Third, Bouyer et al. (2013) claim that we have taken no account of the importance of local variations in tsetse ecology in the design and costing of operations. However, our paper aimed at a general comparison of costs for which it was appropriate to consider a theoretical, square-shaped intervention area of 10,000 km², homogeneously infested by a single fly species. Our costings were inflated to allow for the commonly accepted need to investigate how optimal control policy in specific situations is affected by local ecology. Bouyer et al. (2013) appear to believe that the distribution of riverine tsetse is always going to make insecticide-based operations more problematical than with savannah tsetse, to the point that such operations can never succeed with riverine flies. In fact, the more that riverine tsetse are confined to small isolated pockets the more readily and economically they can be tackled in comparison with highly mobile tsetse spread across vast areas of savannah.

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Fourth, the more recent advances in bait methods of attacking tsetse seem particularly objectionable to Bouyer et al. (2013). These new systems are so simple and economical that they make more credible the idea of living with locally reduced populations of the flies, instead of opting for widespread elimination. The use of insecticide-treated cattle (ITC) in the stamp out sleeping sickness (SOS) project in Uganda is singled out for special criticism. In reality, SOS has shown that ITC offers one of the most economical, effective and feasible means of dealing with riverine tsetse and sleeping sickness (Selby et al., 2007; Butcher, 2009; Selby, 2010; Hargrove et al., 2012). And it is a reduction in disease incidence, rather than in tsetse numbers, which should be the primary goal of all operations against tsetse. The obvious point made by Bouyer et al. (2013), that ITC cannot be used where cattle do not occur, has long been recognised, both in theory (Torr and Vale, 2011) and in practice (Torr et al., 2005) – the corrective expedient being to supplement ITC by placing insecticide-treated targets in parts of the operational area where cattle do not go, or occur in densities too low for ITC to be effective. Moreover, contrary to the view of Bouyer et al. (2013), the demonstration of the efficacy of tiny targets for use against riverine tsetse (Lindh et al., 2009) is encouraging, especially since such targets are ideally suited to deal with tsetse in small pockets. Bouyer et al. (2013) have failed to appreciate that our costings for traps or targets make full provision for overall operational costs, in the same way that we consider the overall costs of other techniques.

Fifth, in promoting the use of SIT, Bouyer et al. (2013) fail to mention that our costing for that technique puts it in the most favourable light. Thus our estimates for the costs of SIT relate to 10,000 km², so that economies of scale could be realised, leading to costs within the range cited in Feldmann (2004). However, the fact that Bouyer et al. (2013) suggest that SIT is particularly important in dealing with small pockets, implies that the cost per km² for adding SIT could well be five times greater than calculated in our paper and in line with what was recorded in Unguja (Msangi et al., 2000). Furthermore, we accounted for only one species of tsetse being tackled by SIT. If, as in many places, more than one species must be attacked, the cost of SIT is likely to rise by a further 60% per species (personal communication, Udo Feldmann). This contrasts sharply with the fact that insecticide-based control can deal with several species at once, at little or no extra cost.

Returning to the suggestion by Bouyer et al. (2013) that we have provided misleading advice, our paper contains only two statements that could be interpreted as advice. First we recommended that decision-makers should consider full costs, rather than the conventionally cited partial costs. Second we suggested that for the time being control may be the better option than elimination in many places. We stand by that advice, recognising that it is at variance with the agenda that has dominated attempts to deal with tsetse over the past 15 years, whereby decision-makers were encouraged to set elimination as their only goal, and to rely on SIT to achieve it. That agenda has failed half a generation of Africa's poor and marginalised rural inhabitants, who have received little or no support or advice on how to

apply existing, cost-effective methods of tsetse control to minimise the incidence of tsetse-borne trypanosomiasis in humans and livestock.

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A.P.M. Shaw

AP Consultants, 22 Walworth Enterprise
Centre, Duke Close, West Way, Andover, SP10
5AP, United Kingdom

S.J. Torr^{a,b,c}

^a Natural Resources Institute, University of
Greenwich, Central Avenue, Chatham
Maritime, Kent ME4 4TB, United Kingdom

^b Vector Biology Department, Liverpool
School of Tropical Medicine, Pembroke Place,
Liverpool L3 5QA, United Kingdom

^c Warwick Medical School, The University of
Warwick, Coventry CV4 7AL, United Kingdom

C. Waiswa

School of Veterinary Medicine and Animal
Resources, Makerere University, P.O. Box
7062, Kampala, Uganda

G. Cecchi

Food and Agriculture Organization of the
United Nations (FAO), Animal Production
and Health Division, Viale delle Terme di
Caracalla, 00153 Rome, Italy

G.R.W. Wint

Environmental Research Group Oxford
(ERGO), Department of Zoology, South Parks
Road, Oxford OX1 3PS, United Kingdom

R.C. Mattioli

Food and Agriculture Organization of the
United Nations (FAO), Animal Production
and Health Division, Viale delle Terme di
Caracalla, 00153 Rome, Italy

T.P. Robinson^{a,b,*}

^a Food and Agriculture Organization of the
United Nations (FAO), Animal Production
and Health Division, Viale delle Terme di
Caracalla, 00153 Rome, Italy

^b Livestock Systems and Environment (LSE),
International Livestock Research Institute
(ILRI), P.O. Box 30709, 00100 Nairobi, Kenya

* Corresponding author at: ILRI, P.O. Box
30709, 00100 Nairobi, Kenya.
E-mail address: t.robinson@cgiar.org
(T.P. Robinson)