CHOICE OF TECHNIQUE FOR CREATING TSETSE-FREE ZONES IN AFRICA: THE COST DIMENSION

African trypanosomiasis, the parasitic disease caused by trypanosomes transmitted by tsetse flies to people and their livestock throughout much of sub-Saharan Africa, is widely recognised as having had a major impact on the development of the continent, in particular on the distribution of its livestock and, sometimes, its human, populations. Today it continues to cause epidemics in human populations, where the disease is always fatal if left untreated, and to leach away the resources of Africa's livestock keepers, obliging them to spend substantial sums on trypanocides to prevent or treat the disease, while still lowering livestock productivity, increasing their death rates and limiting the use of animal traction. Thus, like other widespread chronic diseases of livestock and people, trypanosomiasis contributes substantially to the perpetuation of poverty.

The Pan-African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) has mobilised support from African leaders as well as substantial funding, which may provide the continent with a window of opportunity to intervene effectively to control the disease. But only if PATTEC's initial programmes are seen to be successful – in terms of the areas targeted, the goals set, and cost-effectiveness – will governments, donors and livestock keepers invest in further tsetse control rather than continue to rely on trypanocides. Thus informed decision-making is particularly crucial at this time.

Effective control of trypanosomiasis involves applying a range of measures:

- control of Human African Trypanosomiasis (HAT) by finding and treating patients with drugs, supported by vector control and treatment of livestock with trypanocides, where these animals are important reservoir hosts;
- treatment and prevention of livestock trypanosomiasis using trypanocides, focussing on cows, traction animals and protecting pastoralist herds moving through high tsetse challenge areas;
- suppression of tsetse populations to reduce transmission rates in areas where trypanosomiasis seriously affects human health and/or livestock productivity;
- creation of large tsetse-free zones in areas where the impact of trypanosomiasis is serious, tsetse populations are relatively isolated, and elimination is feasible.

This last option is currently the main focus of PATTEC activities, with proposals to eliminate tsetse from 200,000 sq km across six countries. This brief incorporates the findings of a study to evaluate the comparative costs of eliminating tsetse in southern Uganda using a variety of methods.

• The Options

A wide range of techniques for reducing or eliminating tsetse populations have been developed and deployed. The four approaches described below are those currently most widely recommended. Numerous and extensive studies have shown that the insecticide levels used in each of these do not have detrimental long term environmental effects.

Traps and Targets

Traps and targets are structures, usually less than 2 cubic metres in size, made from black or blue cloth and metal or wooden rods, which attract tsetse flies visually and may also be baited with natural and/or artificial attractants to improve their efficacy. Flies either pick up a lethal dose of insecticide from the insecticide-impregnated cloth or are lured into a cage where they are trapped. The main tsetse species present in the study area in Uganda is *Glossina fuscipes*.

Currently, there are no effective attractants for this species and so trap densities of 10 per sq km are recommended, rather than the 4 odour-baited traps per sq km used against the other fly in the area, *G. pallidipes*. At these densities the respective costs for elimination come to US$ 920 and US$ 500 per sq km.

Insecticide-Treated Cattle (ITC)

Where cattle are present, they themselves can be treated with insecticide to reduce the fly population. Farmers are often keen to 'protect' their herds in this way, with the additional benefits of controlling ticks and other nuisance and biting flies, and application using a spray is very cost-effective. Costs vary according to method of

A Living from Livestock

application, amount of insecticide used and number of cattle treated per sq km: US$ 240 for the usual 4 cattle per sq km using sprays, US$ 270 per sq km if 8 animals per sq km are treated in this way.

Aerial Spraying - Sequential Aerosol Technique (SAT)

This approach is based on spraying an area with an insecticide from a fixed-wing aircraft, five times at set intervals. The first spray is designed to kill all adult tsetse in the area, thus instantly removing virtually all vectors. Four subsequent sprays kill tsetse as they emerge from puparia buried in the ground. This technique works well on a large scale and is the most rapid of the techniques, achieving elimination in as little as two months, costing US$ 590 per sq km.

Sterile Insect Technique (SIT)

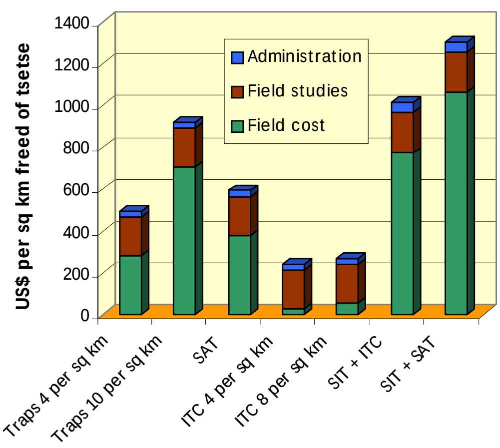
Releasing sterile males into a population reduces overall fertility and hence the growth of a tsetse population. Fly numbers must first be suppressed to reduce the required number of costly sterile males and to avoid greatly increasing the number of viable vectors of the disease in circulation. The costs of SIT are thus necessarily additional to those of the suppression technique used and its use is usually envisaged in situations where other techniques cannot achieve elimination. Overall costs range from US$ 1,010 if suppression is done using ITC to US$ 1,300 per sq km if SAT is used for suppression.

• Conclusion

While the cost differentials and the calculations involved are relatively straightforward, information about the effectiveness of the various techniques, under different conditions, against different tsetse species and applied on different scales, is still sometimes lacking. Major differences in the costs, time scales and logistical constraints of different techniques might suggest an obvious 'best bet' for a particular intervention. However, it seems likely that for area-wide operations, more than one technique will be necessary: insecticide-treated cattle may be cheap but cannot be used where cattle are absent; aerial spraying may be fast but is impossible in broken terrain and cannot prevent reinvasion. This is especially true of those many areas where tsetse populations are not isolated, so it will usually be necessary to use traps, targets or ITC to act as barriers to reinvasion.

Three major recommendations have emerged from this work.

Tsetse elimination cost per sq km



- From the entomological point of view, although much has been published on the effectiveness of the different techniques, overall guidelines for decision-makers are lacking. It is recommended that the various experts work towards achieving a consensus on which technique or combination of techniques is best adapted for which situation, defining their limitations and establishing clear entomological guidelines in a single document. PAAT, the Programme Against African Trypanosomiasis, combines the expertise of FAO, AU-IBAR, IAEA and WHO, and constitutes an international platform to provide guidance on tsetse and trypanosomiasis intervention policies and strategies.
- To support this, there is also a need to study former tsetse control projects paying special attention to the extent to which project scale, reinvasion pressure and organisational sustainability contributed to the ultimate outcomes. A consensus is also needed on these logistical / organisational factors in order to inform decision-making in this field.
- Lastly, as this study has confirmed, that the cost differentials among the different techniques are so substantial that economic considerations must be included among the criteria for choice of technique, especially given the multiple demands on financial resources for such initiatives, which are working towards the over-arching goal of poverty alleviation.

Policy Brief based on:

Comparative Costings of Alternatives for Dealing with Tsetse: Estimates for Uganda, PPLPI Working Paper No. 40, by Alexandra Shaw, Steve Torr, Charles Waiswa, and Tim Robinson.

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http://www.fao.org/ag/againfo/projects/en/pplpi/publications.html