Improving draft animal management with strategic chemoprophylactic control of trypanosomiasis

by

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Abstract

Food production in Africa must increase if the continent's rapidly growing human population is to be adequately fed. One factor in achieving this is to improve and expand the use of animal traction for crop production. Vast tracts of sub-Saharan Africa are infested with tsetse flies which transmit the disease trypanosomiasis to both man and animals. The anaemia associated with trypanosomiasis causes weakness, lethargy and a lack of stamina, which reduce the efficiency of working animals. Thus, control of this disease is a prerequisite for sustainable agricultural development in this region.

In the past, trypanocides were freely available from government veterinary personnel. With the introduction of cost recovery schemes, farmers will be required to pay for treatment of their animals. Thus, poor farmers may treat individual animals only, rather than their whole herds.

A strategy is proposed for the chemoprophylactic treatment of work oxen before the start of the plowing season. The strategy should be affordable and acceptable to farmers, and close cooperation between animal husbandry and veterinary personnel is essential for its success. A similar approach to the control of other diseases to improve animal traction should also be considered.

Introduction

Sub-Saharan Africa is poor and becoming poorer. It is affected more severely than many other parts of the world by the two closely linked crises of high human population growth rates and environmental degradation. Food shortages are estimated to affect one quarter of the population of sub-Saharan Africa, excluding South Africa and Namibia (World Bank, 1989). To overcome these shortages, to feed the growing population (reckoned to double over the next 20 years) and to reduce dependence on food imports, food production must be increased by 4% annually. Suitable policies need to be put into practice, and improved, appropriate technologies must be adopted to achieve this increase. Of crucial importance is the greater use of improved animal traction, to enable increased cultivation and to provide transport in rural areas for crops, fertiliser and other goods.

A unique problem faced by sub-Saharan Africa is that of tsetse-transmitted trypanosomiasis, a disease complex that affects man and animals. Tsetse flies infest 10 million square kilometres. Their presence is a serious constraint on rural development since susceptible livestock cannot be kept where tsetse numbers are high. Even in areas of lower tsetse population density trypanosomiasis poses a serious threat to animal health, and heavy losses occur. The control of tsetse and trypanosomiasis is thus an essential element in the expansion of animal traction and hence sustainable rural development.

Control of trypanosomiasis

The control of African animal trypanosomiasis can be achieved by removal of the tsetse fly, removal (with drugs) of the trypanosomes responsible for causing the disease or rearing breeds of livestock tolerant of trypanosomes. Modifications to management, such as improved nutrition and reduced production stress, can also mitigate the severity of trypanosomiasis. No vaccine against trypanosomiasis exists and none is likely to be available before the year 2000.

Tsetse control can be achieved by several different methods which have to be used on a large scale to be successful against the widely dispersed savanna species of fly common in southern Africa. Consequently, the means to alleviate trypanosomiasis by controlling tsetse lie beyond the resources of an individual farmer, or even of a group of farmers. This is in contrast to other parts of Africa where inexpensive bait methods used by a group of livestock owners can reduce the impact of trypanosomiasis to manageable levels. Neither can farmers in southern Africa exploit trypanotolerant breeds of livestock; these breeds are not available in the region.

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Pending large-scale tsetse control the main approach to trypanosomiasis control continues to be the use of trypanocidal drugs, either to treat infected animals or to protect healthy stock. Historically in southern Africa, trypanocides have been administered by government veterinary staff, often through mass inoculation campaigns. Trypanocides also provide the individual farmer with a way to control the disease.

The rational use of trypanocides is determined by the local epidemiology of the disease. This is always complex and results from the interaction of tsetse flies, livestock, wild animal hosts and management practices. These aspects are all dominated by climate and season. The unimodal rainfall in this region results in the seasonal dispersal of tsetse flies soon after the rains begin, followed by a rise in the incidence of trypanosomal infections.

In addition to this seasonal increase in the risk of trypanosomiasis, the movement of livestock into tsetse habitats or the gradual advance of tsetse into previously uninfested areas also places livestock at risk. Tsetse-transmitted trypanosomiasis is thus a highly dynamic problem, and the timing of trypanocidal treatments should reflect local variations in the risk of disease.

The Pan-African Rinderpest Campaign (PARC) of the Organisation of African Unity has as a major objective the revitalisation of veterinary services. One of the principles promoted by PARC is that of cost recovery. Farmers will therefore be required to pay for treatments their animals receive. This policy is about to be implemented in many countries of southern Africa.

In tsetse-infested farming areas, livestock owners are unlikely to be willing or able to pay for the continued prophylactic inoculation of entire herds of cattle, even through treatment of individual sick animals may not adequately contain the trypanosomiasis problem.

Trypanosomiasis as a threat

The widespread use of the curative drug diminazene ("Berenil", Hoechst) by farmers to treat undiagnosed cases of 'tsetse fly disease' obscures the true picture in many parts of the region. Consequently, the prevalence of trypanosomiasis is always underestimated. Recent investigations in western Zambia and in the Eastern Caprivi District of Namibia have shown that bovine trypanosomiasis is a serious problem threatening work oxen in particular (Connor, 1991).

The most sensitive direct parasitological method for the diagnosis of animal trypanosomiasis entails examination of the buffy coat of centrifuged blood (Murray et al, 1983). A major advantage of this method is that the haematocrit, or packed red blood cell volume (PCV), can be measured. The PCV is a good indicator of anaemia—the most common pathological sign of trypanosomiasis. Anaemia reduces the blood's oxygen carrying capacity, causing weakness, lethargy and lack of stamina in infected animals.

Although no studies have been reported of the direct effect of trypanosomiasis on animal traction, anecdotal evidence obtained from farmers is convincing. Affected animals are reported to be "lazy to work" and are goaded by being whipped and beaten. More severely affected animals collapse soon after they are yoked. The PCVs of such animals commonly indicate severe anaemia: some individuals have lost half of their red blood cells.

An assessment of trypanosomiasis in work oxen was made in north-west Zimbabwe, the Caprivi District of Namibia and in western Zambia (Connor, 1991). No animal had a PCV lower than 25% and no evidence of the disease was found in north-west Zimbabwe. Of the oxen sampled in Caprivi, 25% were markedly anaemic whereas in the sample from western Zambia 65 out of 95 oxen were anaemic (Figure 1). These findings were made at the beginning of the rainy season when draft animals are in peak demand. The general condition of cattle at the end of the dry season is often poor, and this increases the severity of trypanosomiasis.

A strategy is required to enable farmers to ensure that their draft animals are in good health when they are needed most. The problem of trypanosomiasis must therefore be addressed in tsetse areas.

Strategic chemoprophylactic control

Few livestock owners will be able or prepared to pay for chemoprophylactic treatment of their whole herd when the cost recovery scheme becomes effective, and so tactical chemoprophylaxis has been advocated (FAO, 1991). This tactical approach involves the treatment of selected categories of animals perceived by the farmer to be of greatest economic value. Draft animals are one such category.

The requirements of strategic chemoprophylactic control of trypanosomiasis are that it must be:

- affordable to the farmers
- acceptable to them (they must perceive a tangible benefit)
- economically sustainable

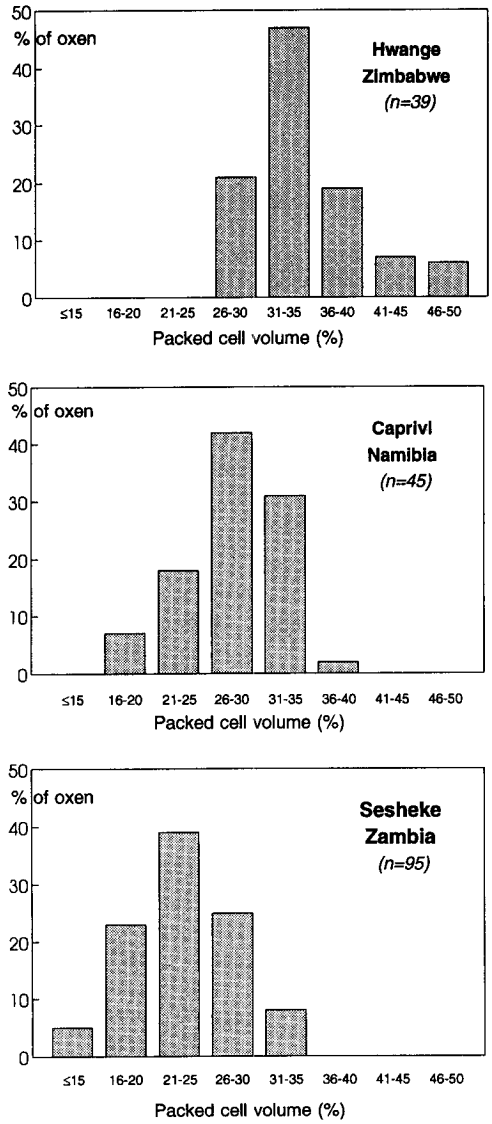

Figure 1: Frequency distributions (%) of packed cell volumes (percentage of blood volume) of oxen sampled in Zimbabwe, Namibia and Zambia in November 1991

The selective treatment of work oxen with the prophylactic trypanocide isometamidium ("Samorin", RMB Ltd) before the end of the dry season has been recommended. This may have to be preceded by curative treatment of sick animals. Isometamidium should be injected deeply into the muscles of the rump two weeks before the animal is worked, to allow the tissue reaction at the injection site to subside. Treatment may need to be repeated after 8 to 12 weeks to maintain protection. The strategic use of trypanocides in this manner would offer protection to the "work force" at a critical time of the year. Diagnostic surveillance would be necessary to enable the regimen to be modified to suit local epidemiological conditions.

Discussion

To improve the condition of work oxen at the end of the dry season supplementary feeding has been advocated, in the belief that animals in better condition will have a higher work output. Recent findings indicate that this practice gives little benefit to the farmer (ILCA, 1991). Irrespective of their condition score, work oxen used in the trials fulfilled the tasks demanded of them by the farmer. However, it is important to distinguish between physical condition and physiological condition. The anaemia associated with trypanosomiasis, or for that matter other diseases, impairs oxygen uptake and work output, and affected animals are also often in poor condition. It is necessary to recognise trypanosomiasis and to adopt strategic chemoprophylaxis.

To implement the strategy on a wide scale will require close collaboration between animal husbandry specialists and veterinary staff. Arrangements to ensure the simultaneous availability of drugs, needles, syringes, transport and trained personnel will have to be made. It would also be essential to inform farmers of the objectives and anticipated benefits of the strategy before its implementation, in order to secure their participation on a cost recovery basis.

This proposal considers only the strategic control of trypanosomiasis in draft animals. However, the same arguments apply to the control of liver fluke, foot and mouth disease and other major diseases. There is a need to link disease control in general more closely with sustainable animal production.

References

Connor R J, 1991. *Mission report 77/RTE/91. Zimbabwe, Namibia and Zambia. 16 December 1991.* Regional Tsetse and Trypanosomiasis Control Programme, PO Box A560, Avondale, Harare, Zimbabwe. 15p.

FAO, 1991. *Trypanosomiasis control as an element of sustainable agricultural development.* Report on a meeting of the FAO panel of experts on technical and ecological aspects of the programme for the control of African animal trypanosomiasis and related development. Harare, Zimbabwe, 24–26 June 1991. Food and Agriculture Organization of the United Nations (FAO), Rome, Italy. 22p.

ILCA, 1991. *ILCA 1990: annual report and programme highlights.* International Livestock Centre for Africa (ILCA), Addis Ababa, Ethiopia. pp. 15–24.

Murray M, Trail J C M, Turner D A and Wissocq Y, 1983. *Livestock productivity and trypanotolerance.* Network Training Manual. International Livestock Centre for Africa (ILCA), Addis Ababa, Ethiopia. 198p.

World Bank, 1989. *Sub-Saharan Africa. From crisis to sustainable growth. A long-term perspective study.* World Bank, Washington, DC, USA. 300p.